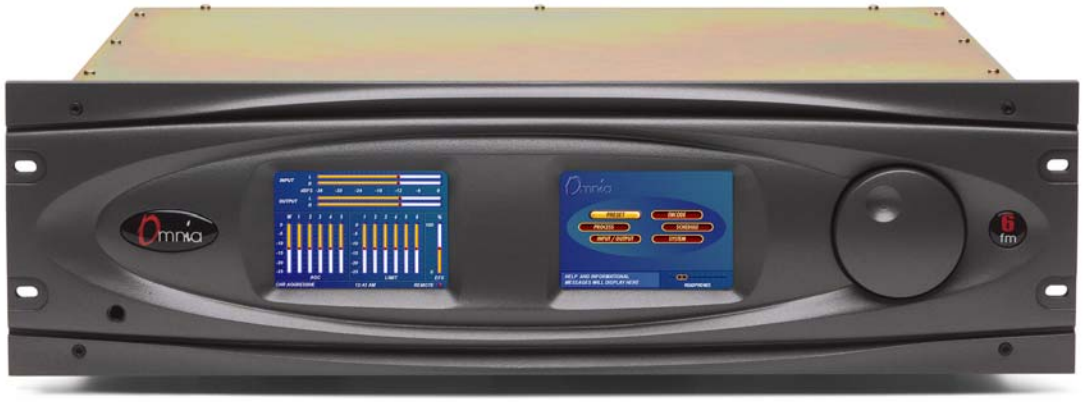


OMNIA – 6FM

Broadcast Audio Processor

Installation and Operation Manual
Version 1.00a

January 2002

Omnia ● 2101 Superior Avenue Cleveland, Ohio 44114 USA
TEL: +1 216.241.7225 ● FAX: +1 216.241.4103 ● Email info@omniaaudio.com www.omniaaudio.com

Omnia Europe ● Johannistrabe 6 D-85354 Freising Germany
TEL: +49 8161 42467 ● FAX +49 8161 42402 ● Email: europe@omniaaudio.com www.omniaaudio.com

Manual Update Notification

Due to the dynamic nature of audio processing products, this manual and all future manuals, will be considered as 'preliminary documentation'.

Audio Processing is an art form that we take very seriously. As part of our dedication to this science, we will continue to update both the product and its documentation based on continued research, field experience and valued customer input.

We strongly encourage our customers to visit our Omnia website for product enhancement announcements, software updates, manual updates, and customer care bulletins.

The following URL listing has been included for your update convenience:

Manual Updates	http://www.omniaaudio.com/support/manuals/manuals.htm
Installation Tips	http://www.omniaaudio.com/support/oinstall.htm
Tech Bulletins and Papers	http://www.omniaaudio.com/techinfo/default.htm
Tech Support – Software Upgrades	http://www.omniaaudio.com/support/default.htm
Warranty	http://www.omniaaudio.com/support/warranty.htm

Thank you for selecting the incredible Omnia 6 Audio Processor. Your continued patronage and support are appreciated.

Sincerely,

Team Omnia

January, 2002

Greetings!

It's with great pleasure to offer you our ultimate audio processor…Omnia-6fm! But first, I must share my gratitude with you as well. This second-generation FM processor has evolved from the original Omnia digital processors, and the worldwide acceptance of those has been quite humbling for me, to say the least. As I write this, Omnia processors are now deployed by so many leading broadcasters throughout the world that when looking at the list, I am overwhelmed by the recognition that my (originally small) project to improve the sound of radio has gathered. So, it's to you I say…*Thank You!*

1986 seems like just a short time ago! It was that year, in the engineering shop at Z-100, (WHTZ-FM) New York City that our first product was born…*The Vigilante FM Limiter.* Now, 15 years later, along with an incredibly talented team of fellow broadcasters and engineers, we offer you the next progression in broadcast processing: Omnia-6! This processor is not just Frank anymore. It's a complex effort from a tremendous team that has had only *one* goal in mind…to raise the bar, *yet again,* and present you with the best product possible.

I don't have enough space here to thank each and every one of the Telos/Omnia worldwide team members who have contributed to this product in so many important ways. All I can say is that we would not be where we are without the heroic and brilliant efforts of all of you working together. I would be remiss not to mention one individual though… Jeff Keith, the leader of Team Omnia. His creativity, passion and commitment to our success have helped all the various talented (and sometimes chaotic) crew unite in a common goal. To build a processor so great, it would surpass even *my* high expectations. Jeff, you and your team have succeeded! Thank You. It's our goal to set the standard by which all others will be judged. The rules have changed, and Omnia is the reason why! What was once a truly small company consisting of only my cat Vito and myself has now expanded to the point of having the *best* talent in every area of product design, engineering, and marketing. (Not to mention, we now have the vital assistance of *three* cats...*Omnia, Zephyr,* and *Mocha*.)

If I may say so, our pool of engineers for DSP development and software design is probably the finest in the radio industry. My partner in crime, Steve Church, brought DSP into the broadcasting field in the mid-1980's and we've been strengthening our abilities ever since. Sharing Telos' ingenuity for DSP design has been tremendously beneficial to our work on Omnia. If you thought the original Omnia made noise on the dial, all I can say is "look out!" It's like one of the top-of-the hour station ID's Scott Shannon used to jam on Z-100*..."Lock It In And Rip The Knob Off!"* That's the kind of power and capability Omnia-6 delivers!

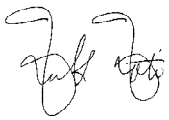
Beyond the extensive laboratory development and testing of Omnia-6, we've taken it to the field and compared it with *every* other processing system available – and have done so worldwide. It's the sound that matters, and I truly feel that you'll significantly improve your on-air sound and further your competitive position with Omnia-6.

Omnia-6 also benefited from a few other individuals who were behind the scenes. You guys know who you are. To each of you, another heartfelt "thanks!" But I above all need to express my gratitude and love to someone who has influenced me as a person, a thinker, an engineer, a businessman, and by way of his example, showed me that you can always raise the bar…my father Sam Foti. Dad, my part of the Omnia work has been blessed with a spiritual beauty that you've instilled in me, as your contribution to my life has helped beyond your wildest imagination. Thus, I dedicate Omnia-6 to you for all that you are!

Not only do you have in your possession the best sounding audio processor available, you also have the full support of our organization. If you have something to say, we're here to listen. We've been fortunate through the past, that people like you have taken the time to offer us valuable feedback and review of our endeavors. You can now see the result of that, as you are now rewarded with the next step forward!

Without further adieu, it's time for us to jam! So, as my buddy Scott Shannon would often say to me, *"Frank-o, Let's Crank It Up Man!"*

Here's to Dial Dominance,



Frank Foti

TABLE OF CONTENTS

Greetings ii
Safety Instructions iv
Hazard / Warning Labels v
Notices vi
Specifications vii
Warranty viii
QuickStart Setup Guide vix

1 – INSTALLATION

Omnia 6-fm Pre-installation Tasks 1
PC Card and Modem Installation 1
AC Environment Considerations 1
Installation and Connections 2
Rack Mounting 3
AC Connection 3
Audio Inputs 4
Audio Outputs 4
Composite Outputs 5
19 KHz Sync Output 5
SCA Input 5
Ethernet Connection 5
RS-232 Connection 5
Interface Connection 6
Powering Up 7

2 – THE OMNIA 6 USER INTERFACE

User Interface Introduction 9
Using the Jog Wheel 10

Level Meters and Processing Bargraphs 11
Audio I/O Level Display 11
Processing Display 11

Main Menu Display 12
Home Icon 12
"X" Close Window Icon 13
Remote Control via Network Indicator 14
Headphone Level Control 14

User Interface Tutorial 15
The Menu Tree – part one 17
The Menu Tree – part two 18
Menu Items 19
Preset 19
Process 19

User Interface Tutorial, cont.
Input & Output Submenus 20
Encode 21
Schedule 21
System 22

Menu Selections 22
Preset 23
Preset List 23
Choose (preset) 23
Modify (preset) 23
Save Current (preset) 23
Save Current As 24
Compare 24

Process 25

Input 25
Input Gain Left / Right 25
Master Drive 25
Input Source 26
Input Mode 26
High Pass Filter 26
Phase Rotator 26
Pre-emphasis 26

Output 27
Peak Output Level 27
De-emphasis 28
Output Sample Rate 28
Multiplex Power Limiting 29

Encode 30
Composite Output 1 & 2 30
SCA Level 30
Pilot Injection 30
Pilot Phase 31
Separation 31

Schedule 31
Schedule List 31
New 32
Modify and Remove 32
Load From Card 32
Save To Card 32
Current State 32

System 33
Port Baud 33
Security Lev(el) 33
Backlight 34

Set Time 34
Set Date 34
About 34
Change Password 34
Lock Unit 34
Load Defaults 35
Load From Card 35
Save To Card 35

Network 36
Mac Address 36
IP Address 36
Gateway 36
Subnet Mask 36
Save Changes 36
Reboot Display 37
Test Broadcast 37

Security Config 37

3-THE OMNIA-6FM AND AUDIO PROCESSING

Process Block Diagram 39
Wideband AGC 40
Phase Linear Crossovers 40
Five Band AGC 40
Enhancer Section 40
Deep Bass EQ 41
Phat Bass EQ 41
Warmth EQ 41
Stereo Expander 41
Multiband Dynamic Peak Limiter 41
Distortion Canceled Clipper 41
Stereo Generator / Encoder 41
Composite Clipper 42
Pilot Protection Filter 42

4- PROCESSOR INTERFACING

Processor Location 43
Analog STL Use 43
Digital STL Use 44
Monitoring Location 44
Source Material Quality 44
Studio Microphone Processing 45
Processor Latency / Time Delay 45
Operating Levels 45

Omnia-6fm Connections 46
Output Connection Options 46

Interfacing with a Digital STL/ Exciter 46
Pre-emphasis – where to insert? 46

5-FINE TUNING YOUR SOUND

About Loudness and Listener Fatigue 49

Clarifying your Processing Objectives 49
Adjustment Procedure 50

Meter Displays 51
AGC Metering 51
Limiter Metering 51
Interpreting the Meters 52

About Factory Presets 53
Loading a Preset 54
Parameter Editing 55
Adjusting the Wideband AGC 56
Adjusting AGC Crossovers 58
Adjusting Multiband AGC's 59
Adjusting the AGC Mixer 60
Adjusting The Enhancers 61
Adjusting the Limiters Crossover 62
Adjusting the Multiband Limters 63
Adjusting the Final Mixer (Lim Mix) 64
Adjusting the Clippers 65
Adjusting the MPX Power Limiter 66

Saving, Naming, and Deleting Presets 68
Saving Presets 68
Renaming and Deleting Presets 69

Getting the Sound You Want 69
A Word About Loudness 69
Quality versus Loudness 70
Increasing Loudness 70
Adding More "Detail" to the sound 71
Making Sound Equalization Changes 72
Thunder Bass 72

6 – Remote Control Software

Software Installation Options 75
Using the Self-Installer 75
Using the raw executable 76
Setup and Configuration 76

Finding the software version number 77

Edit Connection dialog box 78
Using the supplied modem 79
Using your own modem 79
Using a Direct Serial Connection 80

Connecting via Modem 80
Custom modem initialization strings 81
Using an Ethernet based connection 83

Establishing a Remote Session 84

Terminal Programs/Direct Connection 85

Trigger Script Editor 86
Dry Contact Closures 86
Applying Control Voltages 86

Use of Trigger Scripts 87
Paras and Sysparas 88

Using the Editor 88

Script Command Definitions 90
Dayparts 90
Presets 90
Non-system Parameters 91
System Parameters 92
Setting New Syspara Values 93

Using the Script Editor 93
Example: Switch to Mono 94
Example: Switch to Stereo 94

Interface Connector 96
"One Way" Scripts 96

Scripting via Daypart Scheduler 98

7 – Troubleshooting

Rear panel serial port setup 100
Normal boot up message 101
Audio Failure Alarm 102
Audio Restoration Alarm 102

Diagnostic Messages 103

Clearing corrupted NVRAM 104

Diagnosing abnormal boot behavior 106
Narrowing down problems 107

Performing software upgrades 109

Obtaining Service 111

Preset Parameter Worksheet 112

Appendix A

CE Declaration of Conformity

S A F E T Y I N S T R U C T I O N S

1. **Read All Instructions.** All safety and operating instructions must be read before operating the product.

2. **Retain All Instructions.** All safety and operating instructions must be retained for future reference.

3. **Heed All Warnings.** All warnings on the product and those listed in the operating instructions must be adhered to.

4. **Follow All Instructions.** All operating and product usage instructions must be followed.

5. **Heat.** This product must be situated away from any heat sources such as radiators, heat registers, stoves, or other products (including power amplifiers) that produce heat.

6. **Ventilation.** Slots and openings in the product are provided for ventilation. They ensure reliable operations of the product, keeping it from overheating. These openings must not be blocked nor covered during operation. This product should not be placed into a rack unless proper ventilation is provided through following the manufacturer's installation procedures.

7. **Water and Moisture.** Do not use this product near water – for example; near a bath tub, wash bowl, kitchen sink or laundry tub; in a wet basement; or near a swimming pool or the like.

8. **Attachments.** Do not use any attachments not recommended by the product manufacturer as they may cause hazards.

9. **Power Sources.** This product must be operated from the type of power source indicated on the marking label and in the installation instructions. If you are not sure of the type of power supplied to your facility, consult your local power company.

10. **Grounding and Polarization.** This product is equipped with a polarized AC plug with integral safety ground pin. Do not defeat the safety ground in any manner.

11. **Power Cord Protection.** Power supply cords must be routed so that they are not likely to be walked on nor pinched by items placed upon or against them. Pay particular attention to the cords at AC wall plugs and convenience receptacles, and at the point where the cord connects to the product.

12. **Lightning.** For added protection for this product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the AC wall outlet. This will prevent damage to the product due to lightning and power supply surges.

13. **Overloading.** Do not overload AC wall outlets, extension cords, or integral convenience outlets as this can result in a fire or electric shock hazard.

14. **Object and Liquid Entry.** Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short out parts that could result in a fire or electric shock. Never spill liquid of any kind into the product.

15. **Accessories.** Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious damage to a child or adult, and serious damage to the product. Any mounting of the product needs to follow manufacturer's installation recommendations.

16. **A Product and Cart Combination** should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the product and the cart combination to overturn.

17. **Servicing.** Refer all servicing of the product to qualified service personnel.

18. **Damage Requiring Service.** Unplug this product from the AC wall outlet and refer servicing to qualified service personnel under the following conditions:

- When the AC plug is damaged.
- If liquid has been spilled or objects have fallen into the equipment.
- If the product has been exposed to rain or moisture.
- If the product does not operate normally (following operating instructions).
- If the product has been dropped or damaged in any way.
- When the product exhibits a distinct change in performance. This indicates a need for service.

19. **Replacement Parts.** When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer or that have the same characteristics as the original parts. Unauthorized substitutions may result in fire, electric shock, or other hazards.

20. **Safety Check.** Upon completion of any repairs to this product, ask the service technician to perform safety checks to determine that the product is in safe operating condition.

21. **Cleaning.** Do not use liquid cleaners or aerosol cleaners. Use only a damp cloth for cleaning.

HAZARD / WARNING LABELS

CAUTION

RISK OF ELECTRIC SHOCK
DO NOT OPEN

WARNING: SHOCK HAZARD - DO NOT OPEN
AVIS: RISQUE DE CHOC ELECTRIQUE - NE PAS OUVRIR

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE ANY COVER OR PANEL. NO USER SERVICABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL.

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THE OMNIA TO RAIN OR MOISTURE.

The **Exclamation Point** symbol, within an equilateral triangle, alerts the user to the presence of important operating and maintenance (servicing) instructions in product literature and instruction manuals.

The Lightning Flash With Arrowhead symbol, within an equilateral triangle, alerts the user to the presence of uninsulated dangerous voltage within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

WARNING -- This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instructions in this manual it may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device (pursuant to subpart J of Part 15 FCC Rules), designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, at which case, the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

See the following page for additional information.

CANADA WARNING – This digital apparatus does not exceed the Class A limits for radio noise emissions set out in the Radio Interference Regulations of the Canadian Department of Communications. Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limits applicables aux brouillage radioelectrique edicte par le ministere des Communications de Canada.

CE CONFORMANCE – This device complies with the requirements of the EEC Council Directives: 93/68/EEC (CE Marking); 73/23/EEC (Safety – low voltage directive); 89/336/EEC (electromagnetic compatibility). Conformity is declared to those standards: EN50081-1, EN50082-1.

LITHIUM BATTERY CAUTION -- Danger of explosion if the internal battery is replaced incorrectly. Replace only with same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

USE OF SHIELDED CABLING -- To conform to the CE requirements for High Frequency radiation, shielded cables must be used for all audio and data connections. For analog and digital connections, the cable shield MUST be connected to the XLR-type connector shell, which is at chassis ground potential!

NOTICES

All versions of compatibility, trademarks, etc. of hardware and software products not made by Omnia, but mentioned in this manual or other accompanying material, are informational only. Omnia makes no endorsement of any particular product for any purpose, nor claims any responsibility for its operation or the accuracy of its presentation.

Warranty registration and Software Updates

Omnia 6's operation is almost entirely determined by software. A continuous program of improvement ensures that the product remains at the 'cutting edge'. In order to be notified of new software releases, be sure to FAX or mail in the registration form.

Trademarks

Omnia, the Omnia logo, and "The Promise of Digital ... *Delivered*!" are trademarks of TLS Corporation. Dorrough is a trademark of Dorrough Electronics, Inc. All other trademarks mentioned in this work are the property of their respective holders.

Copyright

Copyright © 1997-2002 TLS Corporation. All rights reserved. Published by Omnia, who reserves the right to make improvements or changes to the products described herein (which may affect the product specifications) and to revise this manual as required without notice.

Repair Procedures

You must contact Omnia for a Return Authorization number before returning any products. Packages without proper authorization may be refused. Please write the RA number on the shipping label side of the returned package. Be sure to adequately insure your shipment. Customers in North America can contact Omnia customer support at +1 (216) 241-7225. In Europe, contact Omnia Europe at +49 8161 42467 (Germany). All other customers should contact their local Omnia dealer to verify the problem and then contact Omnia to arrange for repair. Refer to the section entitled "Obtaining Service" for more details.

Caution

The installation and servicing instructions presented in this manual are for use by qualified installation and service personnel only. To avoid electric shock, do not perform any servicing other that than contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified personnel.

Warning

To reduce the risk of electrical shock, do not expose this product to rain or moisture.

Omnia 6fm Specifications

As of January 2002 – Version 6.01 Software

Note: All measurements made with the supplied "FactTest2" preset, which is available in the Preset Submenu. Due to the nature of multi-band gain control and clipper algorithms used, the subjective sound quality of any audio processor bears little relationship to its measured electrical performance.

Overall Specifications

System Frequency Response

Complies with the standard 50 or 75 microsecond pre-emphasis curve within ± 0.50 dB, 30 Hz to 15 kHz. The analog left/right outputs and AES/EBU Digital outputs can be configured for flat or pre-emphasized output.

System Signal to Noise Ratio

> -80 dB de-emphasized, 20 Hz –- 15 kHz bandwidth, referenced to 100% modulation). The measured noise floor is highly dependent upon the setting of the Input and Output Gain controls. The Omnia 6's noise floor is primarily governed by the dynamic range of the Crystal Semiconductor CS5360 A/D Converter, which has a specified Dynamic Range of 105dB. The dynamic range of the Omnia 6 DSP chain is well in excess of 120 dB. Typical SNR using the "FactTest2" preset is greater than –80dB RMS in a 15 kHz bandwidth, referenced to 100% modulation.

System Distortion

Less than 0.01% THD, 20 Hz – 7.5 kHz. (second order harmonic distortion above 7.5 kHz is not relevant in the FM system due to the removal of harmonics by the system's 15 kHz low pass filter)

System Stereo Separation

Greater than 65 dB, 20 Hz –- 15 kHz; greater than 70 dB typical.

Analog I/O

Analog Audio Input

Configuration: Left/Right Discrete Stereo. Electronically balanced, floating, and symmetrical.

Input impedance: 10k ohms resistive.

Maximum Input Level: +24.10 dBu (12.28V RMS).

Nominal Input Level: A 13dBu input signal nets a –12dBFS input meter reading when the Input Gain Control is set to 0.0 dB. Application of a 1.00 dBu input signal nets a -12dBFS input meter reading when the Input Gain Control is set to "+12 dB".

(NOTE: when the Input Gain and Master Drive controls are set to 0.0 dB, a +13dBu input signal results in an input level of –12dBFS, and a Wideband AGC gain reduction of approximately –15dB.

Connectors: Two, EMI-suppressed XLR female. Pin 1 chassis ground, and Pin 2 is "hot".

A/D Conversion:	Crystal Semiconductor CS5360, 24 bit 128x oversampled delta sigma converter. Linear-phase, 21.7 kHz anti-aliasing lowpass filter, with 0.0025dB maximum passband ripple.

Analog Audio Output

Configuration:	Left/Right Discrete Stereo. Electronically balanced, floating and symmetrical. Flat or pre-emphasized response for either 50 or 75 microseconds.
Source Impedance:	20 ohms.
Load Impedance:	600 ohms or greater recommended, balanced or unbalanced.
Peak Output Level (ref 100% modulation):	Adjustable from -6 dBu to +24 dBu peak, into 600 ohms or greater load, software-adjustable.
Stereo Crosstalk:	> -70 dB, 20 Hz -- 15 kHz.
Connectors:	Two, EMI-suppressed XLR-male. Pin 1 chassis ground, Pin 2 is "Hot".
D/A Conversion:	Crystal Semiconductor CS4390 24 bit, 128x oversampled.

Digital I/O

Digital Audio Input

Configuration:	Stereo per AES/EBU standard, Crystal Semiconductor CS8420 Digital Audio Transceiver with 24 bit resolution, software selection of stereo, mono from left, mono from right or mono from sum. Automatically accepts sample rates between 32 and 96 kHz.
Connector:	XLR-female, EMI-suppressed. Pin 1 chassis ground, pins 2 and 3 transformer isolated, balanced, and floating – AES3 standard 110 ohm impedance.

Digital Audio Output

Configuration:	Stereo per AES3 standard, Crystal Semiconductor CS8420 Digital Audio Interface Transceiver with 24 bit resolution. Output can be configured in software for flat or pre-emphasized response at 50 or 75 microseconds.
Digital Sample Rates:	Output sample rates software selectable for 32kHz, 44.1kHz, 48kHz, and 96 kHz.
Connector:	XLR-male, EMI-suppressed. Pin 1 chassis ground, pins 2 and 3 are transformer isolated, balanced, and floating. Standard AES3 specified 110 ohm source impedance.
Digital Output Level:	-22.0 to 0.0 dBFS software adjustable.

Digital Sync Input

Configuration:	Output sample rate can be synchronized to the signal present on the AES/EBU input, or to the AES3 signal applied to the Ext.
Sync input connector.	XLR-female, EMI-suppressed. Pin 1 chassis ground, pins 2 and 3 transformer isolated, balanced, and floating – AES3 standard 110 ohm impedance.

External Sync Range:	Accepts sample rates from 32kHz to 96 kHz. Used for synchronization of the Digital Output signal to an external reference. Automatically accepts sample rates between 32 and 96 kHz.

Composite Outputs

Composite Baseband Outputs

Configuration:	Two electrically independent outputs. Software based level adjustment.
Source Impedance:	10 ohms or 75 ohms, internal jumper-selectable. Single-ended and floating over chassis ground.
Load Impedance:	50 ohms or greater load is suggested.
Output Level Range:	1.25 V p-p to 9.50 V p-p, software selectable.
Pilot Level:	Adjustable from 6.0% to 12.0% in 0.1% steps.
Pilot Stability:	19 kHz, ± 0.5 Hz. Tighter tolerance available on special order.
D/A Conversion:	Burr Brown PCM1704, 24-bit sign-magnitude D/A converter.
Signal-to-Noise Ratio:	-85 dB typical, 75 µS de-emphasized, 15 kHz bandwidth, referenced to 100% modulation).
Distortion:	< 0.02% THD 20 Hz – 15 kHz bandwidth, 75 µS de-emphasized, referenced to 100% modulation.
Stereo Separation:	Greater than 55 dB, 30 Hz – 15 kHz.
Linear Crosstalk:	> -80 dB, main to sub or sub to main channel (referenced to 100% modulation).
Non-linear Crosstalk:	> -80 dB, main to sub or sub to main channel (referenced to 100% modulation).
38 kHz Suppression:	> 70 dB (referenced to 100% modulation).
76 kHz Suppression:	> 80 dB (referenced to 100% modulation).
Pilot Protection:	> -65 dB relative to 9% pilot injection, ± 1 kHz.
57 kHz (RDS/RBDS) Protection:	better than -50 dB.
Connectors:	Two EMI suppressed female BNC, floating over chassis ground.
Maximum Load Capacitance:	5nF (at 10 ohms source impedance).
Maximum cable length:	100 feet/30 meters RG-58A/U.

System Remote Control

Remote Control Methods

Configuration:	Modem, direct serial, or 10/100BaseTX Ethernet.
Modem:	Supplied PCMCIA modem with pop-out X-jack connector or any Hayes command set compatible external modem.

Direct Serial:	Standard RS-232, no hardware handshaking employed. Baud rates of 9,600, 19,200, and 57,600 supported.
TCP/IP Ethernet:	Emulates a Telnet session.
Connectors:	RS-232 port, EMI-suppressed DB-25 female connector. Industry standard EMI suppressed RJ-45 connector for Ethernet.

Remote Control Trigger Interface

Configuration:	Eight (8) inputs, RS-232 level-compatible. Software sensing of both 'go-high' and 'go-low' transitions. Inputs are protected to +/- 15 VDC.
Connector:	EMI suppressed DE-9 male.
Control:	User-programmable using built-in Trigger Script feature in included Omnia 6 Remote Control software. Virtually any parameter of the Omnia 6 may be programmed to change through this interface.

Miscellaneous

Power Requirements

Voltage:	100-250 VAC, 50/60/440 Hz., 50VA
Connector:	EMI suppressed IEC male. Detachable 3-wire power cords supplied for US and European use.

Internal Power Supply

Overvoltage and short circuit protected. Meets EN55022, EN55011 Level B Conducted Emissions. EN61000-4-2, -3, -4, -5, -6 level 3 immunity compliant. EN60950, VDE0805, IEC950, UL1950, BABT, CSA C22.2 No. 950 Approvals. Full international safety approval. CE marked. MTBF – 150,000 hours minimum per MIL-HDBK-217F.

Environmental

Operating Temperature: 32 to 122 degrees F (0 to 50 deg. C) for specified operating voltage ranges.

Humidity: 0-95% Relative Humidity, non-condensing.

Dimensions

19" wide x 5.25" high x 16" deep (48.26cm wide x 13.335 cm high x 40.64 cm deep) including connectors. Unit requires three EIA rack spaces for proper mounting.

Shipping Weight: 35 lbs. / 15.876 kg

Telos/Omnia Research and Development is constantly working to improve the quality of our products. Actual operating specifications are subject to change or improvement without notice.

Warranty

This Warranty covers "the Products," which are defined as the various audio equipment, parts, software and accessories manufactured, sold and/or distributed by TLS Corp., d/b/a Omnia (hereinafter "Omnia").

With the exception of software-only items, the Products are warranted to be free from defects in material and workmanship for a period of two years from the date of receipt by the end-user. Software-only items are warranted to be free from defects in material and workmanship for a period of 90 days from the date of receipt by the end-user.

This warranty is void if the Products are subject to Acts of God, including (without limitation) lightning; improper installation or misuse, including (without limitation) the failure to use telephone
and power line surge protection devices; accident; neglect or damage.

EXCEPT FOR THE ABOVE-STATED WARRANTY, OMNIA MAKES NO WARRANTIES, EXPRESS OR IMPLIED (INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE).

In no event will Omnia, its employees, agents or authorized dealers be liable for incidental or consequential damages, or for loss, damage, or expense directly or indirectly arising from the use of any of the Products or the inability to use any of the Products either separately or in combination with other equipment or materials, or from any other cause.

In order to invoke this Warranty, notice of a warranty claim must be received by Omnia within the above-stated warranty period and warranty coverage must be authorized by Omnia.
If Omnia authorizes the performance of warranty service, the defective Product must be delivered, shipping prepaid, to: Omnia, 2101 Superior Avenue, Cleveland, Ohio 44114.

Omnia, at its option will either repair or replace the Products and such action shall be the full extent of Omnia's obligation under this Warranty. After the Products are repaired or replaced, Omnia will return them to the party that sent the Products, and Omnia will pay for the cost of shipping.

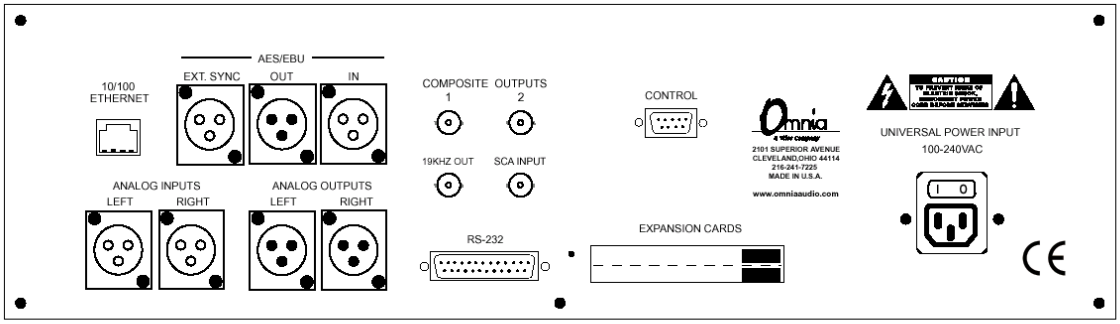
Omnia's authorized dealers are not authorized to assume for Omnia any additional obligations or liabilities in connection with the dealers' sale of the Products.

Omnia products are to be used with registered protective interface devices which satisfy regulatory requirements in their country of use.

Omnia 6 Quick-Start Setup Guide

We know that you're probably in a hurry to get on the air with your new Omnia 6. If you have technical expertise and previous knowledge of audio processor fundamentals, using the following Seven-Point Quick-Start Checklist will get you up and running as quickly as possible. Please refer to the remainder of the Operating Guide for additional information.

Refer to the following drawing for the location of the various connectors associated with the installation:



Omnia-6 Back Panel Connections

1. Install the Omnia 6 in the equipment rack using at least two rack screws. If only two screws are used, they MUST be in the bottom holes of the rack ears!

2. Connect AC power to the unit, and turn on power using the rear-panel power switch.

3. Connect the audio inputs that are appropriate for your installation.

4. Navigate to the Input Menu and select the Analog or AES/EBU input. If your audio source is providing an audio feed you should see meter activity on the Input, Output, and Processing meters.
5. While in the Input menu and observing the Input meters, adjust the left and right input level controls until the input meters are peaking no higher than –12dBFS.

6. Connect the audio outputs that are appropriate for your installation.

7. If you are using the Analog or Digital audio outputs, navigate to the Output Menu and adjust the output levels for the equipment that follows the Omnia.

8. If you are using the Composite Outputs, navigate to the Encode Menu and adjust the Composite Outputs to match the device following the Omnia 6.

You're now ready to go on the air!

Note that the Omnia 6 is shipped with the RocknRoll preset as the default. While leaning toward the competitive side, it provides a good generic starting point, with a rich and balanced sound, which is a good starting point for nearly every format. Remember that our preset names do not necessarily mean that the preset is useful for only the formats to which the name refers. Feel free to experiment!

Chapter 1 – Pre-installation

We believe the Omnia-6fm is the easiest processor to install in its class, but please take a few minutes to read through this chapter before proceeding with the installation.

Pre Installation Tasks

This section offers common procedures for installing your new Omnia-6fm processor. Note that there are additional installation and operation tips presented in Chapter 4 that may pertain to your specific installation.

Omnia-6fm Components

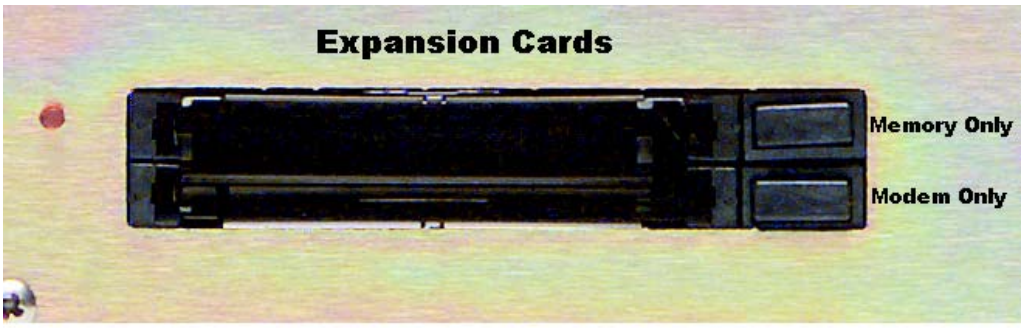
By now, you've unpacked the shipping carton to gain access to this manual. Now is the time to inspect the Omnia-6fm unit and its shipping carton for any signs of shipping damage, which must be reported to your carrier for any claims. The Omnia-6fm shipping box includes the following components:

- Omnia-6fm processor (containing the DSP hardware)
- Omnia-6fm PCMCIA Type Memory card (holding the DSP software)
- PCMCIA Type Modem Card for use with Omnia 6-fm Remote Control
- Omnia-6fm Operating Manual (this document)
- Warranty Registration Card (Please complete the form and return/FAX it to Telos/Omnia)
- Two IEC Power Cords, one for use in the US, and one for use in Europe

PC Card & Modem Installation

Before installing your Omnia-6fm, or even plugging in the power cord, make sure the Omnia-6fm PC Memory Card and Modem Card are installed into the correct card slots on the back panel and are fully seated. Installation or removal must be done with the power ***off*** unless directed otherwise.

The PC Memory Card is inserted into the ***top*** card slot with the Omnia label facing up. The Modem Card is inserted into the ***bottom*** card slot below the Omnia PC Card. Both the PC Card and the Modem Card are keyed to prevent improper insertion. Gently press the cards into the slots until the black release button, to the right of the card, pops out about 1/2" [12.70 mm]. This indicates the card is properly seated in the PCMCIA slot.



The Omnia-6fm also contains a second PC Memory Card that contains the software for the Front Panel. This card has been pre-installed at the factory and is located under the top cover on the right-hand side of the Front Panel circuit board. Please make sure the AC power is ***off*** and disconnected from the unit before removing the top cover and removing or replacing the card.

Important Note 1: The PC Cards used in the Omnia-6fm are not *generic* PCMCIA cards that can be bought in any local computer store. They are cards that are specified by Omnia specifically for this product. If you need a backup card, please contact Omnia Customer Support to purchase an additional card. Inserting a card of unknown origin risks damaging the Omnia or the cards, and doing so will void your warranty!

Important Note 2: If you wish to operate the Omnia-6fm using a PCMCIA type modem, you must use the supplied modem card from Omnia. Other modem cards are NOT approved for use at this time. We cannot provide technical support for any other modem card. Typically, any external Hayes compatible modem may be connected to the rear-panel serial port. See chapter 6 for more details on the Modem and the Remote Control Software.

Note: The rear panel PCMCIA Memory Card must remain in the top slot unless you are prompted by the system to remove it. Randomly removing the PC Card without system instruction may cause unpredictable operation and PC Card data damage.

AC Environment

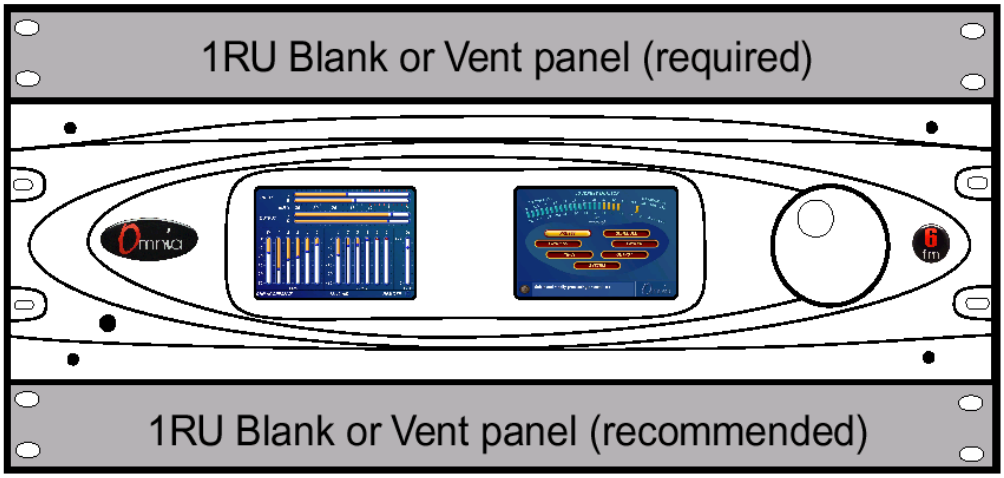
The Omnia-6fm subsystem is microcomputer-based. Therefore, it requires the same clean AC environment as any modern computer system does. Even though the Omnia 6 is equipped with quite robust internal AC input transient suppression, we recommend that external transient suppressers/voltage regulation or an Uninterruptible Power Supply (UPS) be employed. This recommendation becomes even more important when installing the processor at a transmitter site, where there can be heavy transients on the power lines. These unwelcome events can be caused by anything from load switching to lightning strikes on a nearby tower. Therefore, we ask that you give your AC power environment and installation practices thorough consideration before plugging in your Omnia6-fm unit.

Installation & Connections

Throughout this section reference is made to “software parameters.” These are part of the Graphical User Interface, which is covered in detail in Chapter 2.

Rack Mounting

The Omnia-6fm requires 3RU (5.25" [37 mm]) of rack space. Rack mount the unit using four rack screws. If only two screws are going to be used, they should be in the bottom holes in the Omnia front panel. No other two-screw mounting arrangement will prevent distortion of the front panel casting! Adequate ventilation should be provided, and it is always good engineering practice to allow one blank rack space immediately above and below the Omnia, especially if equipment generating significant heat is located below the unit. Install a 1RU (1.75") vented or solid panel to fill these spaces.



Omnia-6fm Rack Mounting Requirements

The processor should be installed into a thoroughly grounded 19" equipment rack. Refer to Chapter 4, Omnia-6fm User Tips”, for additional considerations on where to physically locate your processor.

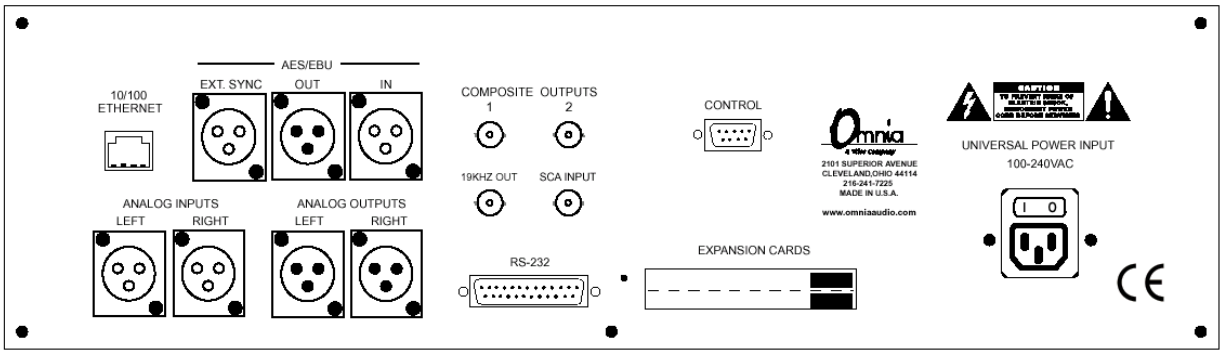
AC Connection (IEC)

The Omnia-6fm utilizes a heavily filtered, universal AC power-entry module. Its integral power switch is located just above the IEC power cord receptacle. The Omnia6-fm's voltage–sensing, switching power supply allows it to operate on AC mains voltages from 100 to 240 VAC, 50/60 Hz. In the USA, plug the provided IEC type AC power cord into the unit and then into a grounded AC outlet. Outside of the USA, you must use the appropriate power cord that complies with local electrical regulations.

Press the “**I**” side of the rear-panel power switch to turn on the unit. The Omnia6-fm is designed to be continuously powered, however, pressing the “**O**” side of the switch turns off the unit for servicing.

When power is first applied, it takes approximately ten seconds to load the DSP code from the rear-panel PCMCIA memory card. During system power-up, the front panel LCD screens display several status screens while the operating software and DSP code is loaded. Once the main Omnia-6fm Main Menu is shown on the right screen, and the Meter Screen is shown on the left display, the unit is ready for use.

Rear Panel Connections



Omnia-6 Back Panel Connections

Audio Inputs—Analog & Digital (Female XLR)

Balanced XLR-type connectors are used as input connectors for both the analog and AES-3 digital audio. Both analog and digital input sources may be connected simultaneously, however, only the input source that has been set in the Input menu is active. Analog/Digital Input source selection is done through the ***Input Source*** software parameter setting in the Input Menu.

The stereo analog inputs are designed for standard +4 dBu balanced signals. Pin 2 is Hot. The digital AES-3 inputs (IN and EXT. SYNC) accept any sampling rate between 32 and 96 kHz. No user adjustment is necessary on the AES input since a high-quality sample rate converter is built into the unit. Individual channel gain and level setting for both analog and digital is done using the ***Input Gain*** software parameter settings in the Input Menu.

A Note About Relative Phase: If the relative phase of your installation (including the Omnia-6fm) differs from that of your existing system, your announcers may feel that they sound "weird" in their headphones. If this occurs, then the relative phase of the processor is 180 degrees from what your air talent is used to. To remedy this, you can either reverse the polarity of both of the analog inputs or change the ***Invert Both*** software parameter setting in the Omnia-6fm Input Menu.

Audio Outputs—Analog & Digital (Male XLR)

Individual Left and Right analog outputs are available on two male XLR jacks, as is a stereo digital AES-3 output. The digital output (with selectable output sample rate) is produced directly from the output of the final processing section. The analog output is derived from a D/A converter driven from the digital output.

Note: Both the analog and digital AES-3 outputs are always active and can be used simultaneously.

Composite Outputs (BNC)

These two low impedance outputs (Composite 1 and Composite 2) are each capable of driving up to 100 feet of RG-58A/U coax cable. The output levels are individually adjustable between the outputs so the unit can operate as a "composite DA" to drive a variety of equipment. The output levels and other stereo generator settings are set through software parameters in the Encode menu. An internal jumper sets the output impedance to either 10 ohms (the factory setting) or 75 ohms. The default setting is appropriate for the vast majority of exciter connections. However, in the event a higher source impedance is required a jumper can be moved (one for each composite output) on the motherboard to change the source impedance to 75 ohms. For reference, J10 is for Composite #1, and J13 is for Composite #2.

19 kHz Sync Output (BNC)

This TTL-level 19 kHz square wave output can be used as the reference signal for any SCA generator that operates at 57 kHz or other multiple of the 19 kHz pilot frequency. This Sync output is phase and frequency locked to the stereo pilot. When this signal is used to synchronize an external SCA or RDS generator, this locking assures that no difference frequencies exist which may cause intermodulation components between the pilot and the SCA signal.

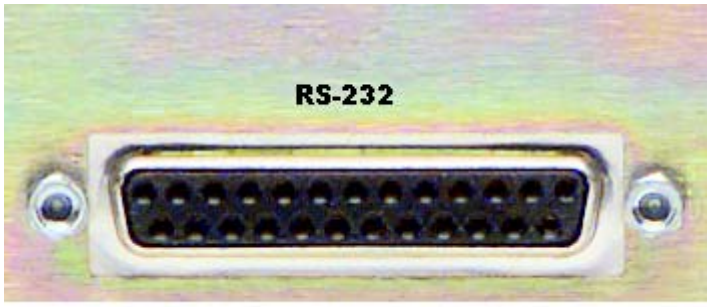
SCA Input (BNC)

Any SCA signal above 53 kHz can be added to the composite outputs of the Omnia-6fm by connecting the SCA signal to the SCA INPUT connector. The SCA signal is mixed in the analog domain directly into both composite outputs. A high-pass filter on the SCA input provides SCA to main-channel crosstalk protection. The SCA deviation level is controlled through the ***SCA Level*** software parameter in the Encode Menu.

Ethernet Connection

The Remote Control link for your Omnia6-fm can take several forms. Dial-up modem, RS-232 serial, and TCP/IP over 10BaseT and 100BaseT networks can be utilized. Using any of these options requires the Omnia-6 Remote Control application that can be downloaded from http://www.omniaaudio.com, the Telos/Omnia website. The setup and operation of the Remote Control software application is covered in detail in Chapter 6.

RS-232 Connection (DB-25F)

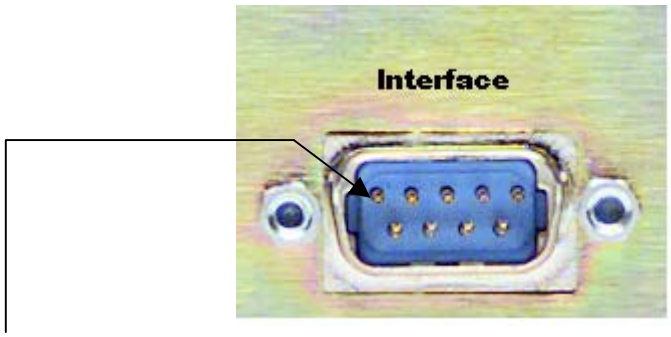


This connector serves two important purposes: It can be used for a local, bi-directional computer connection with Omnia-6 Remote Control, or it can be used for troubleshooting and error code resolution. In the former case, Omnia6-fm Remote Control software is utilized. In the latter, any terminal emulation program can be used. In either

case, you must use a standard, straight-through serial cable (*not* a null modem cable) between the RS-232 connector and the serial port connector on the computer. Typically, a DB25 male to DB-9 or DB-25 female cable will be used, with the DB-25 male end of the cable attached to the Omnia6-fm.

The setup and operation of the Omnia Remote Control application is covered in detail in Chapter 6.

Interface Connection (DE-9M)



Rear Panel Interface Connector for Remote Trigger Script Activation

This connector is the interface to the Omnia's internal trigger script function. Eight of the pins are “trigger” inputs and the remaining pin is the ground reference. The trigger inputs can be used to dynamically alter the Omnia-6fm’s operation in response to logic signal transitions at the interface connection. There is a unique response to each trigger input, that is, both "go-high" and "go-low" transitions are sensed. With eight inputs, and two sensed states for each one, sixteen unique 'trigger events' may be sensed to control the Omnia-6fm in response to these input logic transitions. Virtually ANY parameter of the Omnia can be controlled using the Trigger Scripts.

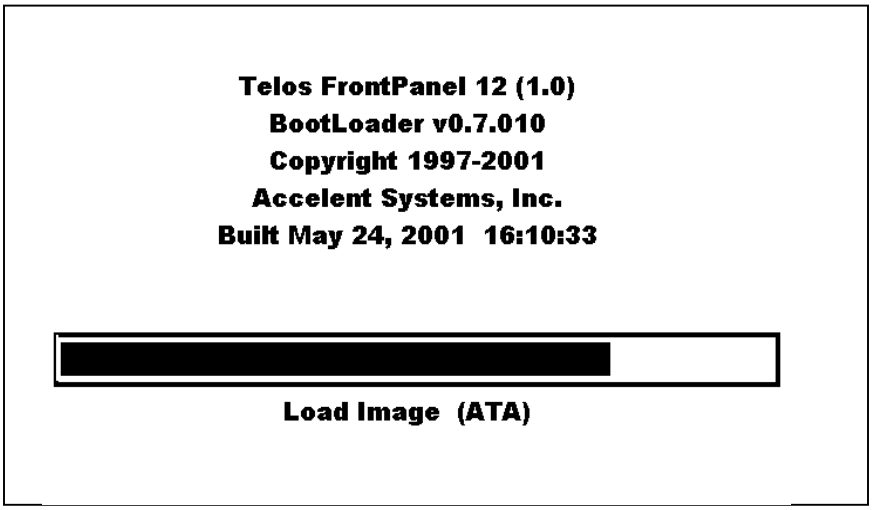
The Trigger Script Interface Editor is a standard component of the Omnia-6 Remote Control application and is covered in detail in Chapter 6.

The ***Pinout*** of the Omnia 6 rear-panel DE-9 Interface connector is as follows:

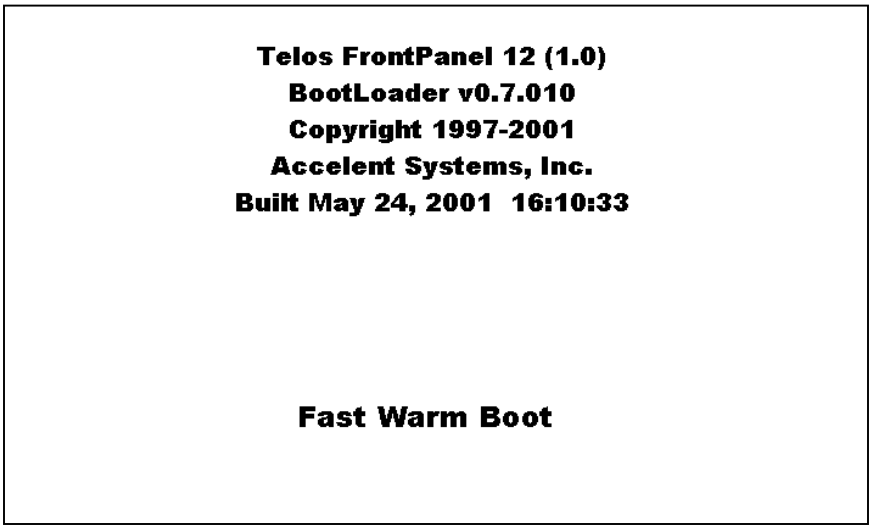
PIN 1 activates Trigger Script 1
PIN 2 activates Trigger Script 3
PIN 3 activates Trigger Script 8
PIN 4 activates Trigger Script 6
PIN 5 is connected to ground
PIN 6 activates Trigger Script 2
PIN 7 activates Trigger Script 4
PIN 8 activates Trigger Script 7
PIN 9 activates Trigger Script 5

Powering Up

When the Omnia-6fm is first turned on, an operating system start up screen is displayed on the left-hand display. Under normal conditions, it should appear as:



If the Network Configuration has been changed from the factory defaults, a second screen will appear when the unit does a warm boot to load the network parameters:



After approximately ten seconds, audio will be present from the analog, composite and headphone outputs. The AES/EBU output becomes usable at this time however, full initialization of the port is not complete for several more seconds. After 25 to 30 seconds, the Meter and Main Menu displays will appear on the left and right LCD screens respectively. At this point, the Omnia 6 is fully operational.

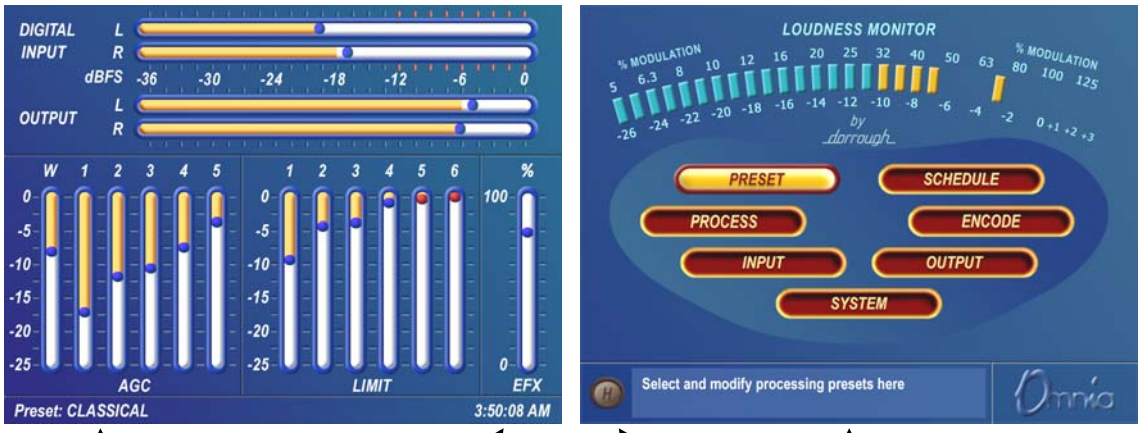
This page intentionally left blank to maintain pagination

Chapter 2

The Omnia 6 User Interface

Now that your Omnia-6fm is rack-mounted, connected to a program audio source, and turned on, you're ready to learn how to operate it! This chapter covers the Graphical User Interface, your window into the Omnia-6fm processor.

A front panel jog-wheel with integral push switch and twin Active-Matrix Color LCDs make up the Omnia-6fm Graphical User Interface. The right-hand screen is the "Menu Display", and it shows the menus, submenus and user-adjustable parameter settings. Also at the top of this screen is the world-renowned Dorrough© Loudness Meter, as implemented in Omnia DSP code. The left-hand screen serves as the "Meter Display". It shows bargraph indications for the AGC and Limiter stages, as well as VU and 'digital sample accurate' peak indications of the Input and Output Levels.

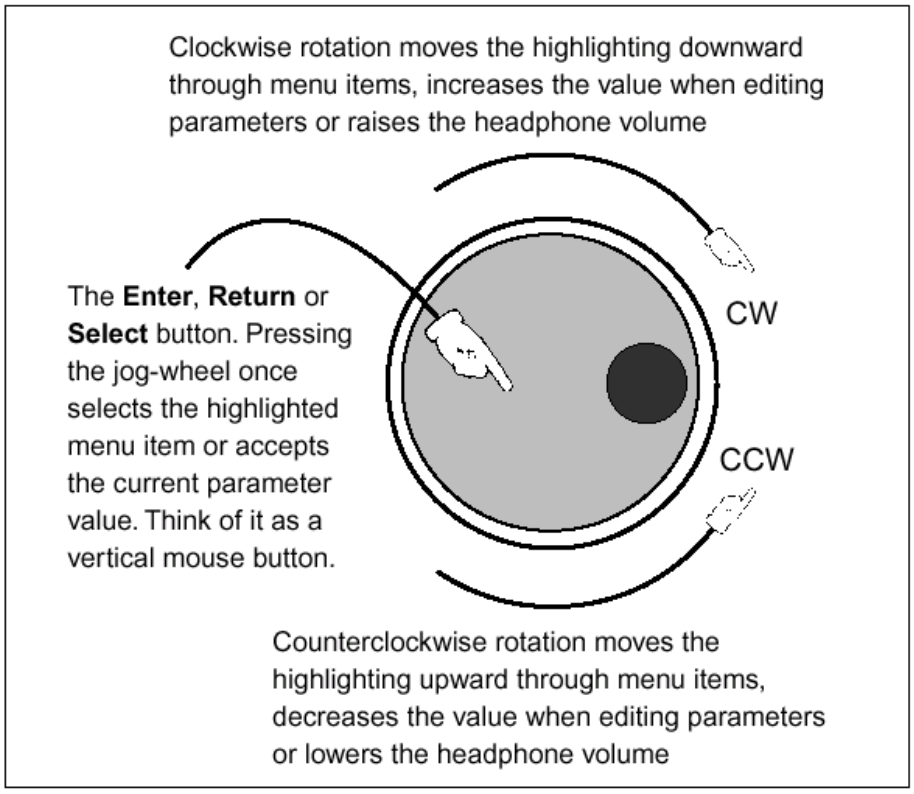


The functions of the Menu Display can be selectively password protected from unauthorized processing or preset changes. The Meter Display dynamically indicates real-time signal processing activity, as well as the Input/Output levels. The back lights for the two displays are automatically turned off after a user set period of jog wheel inactivity, and the factory default timeout is 15 minutes. User options of 1, 5, 15 and 60 minutes turn-off times can be customized under the System submenu.

Using the Jog Wheel

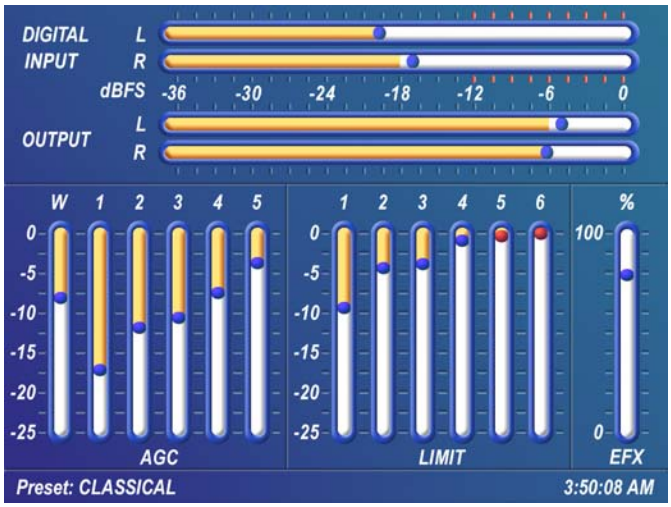
The main user control for the Omnia 6 is the large, easy to use jog wheel with its integral push-switch. Using the control is both intuitive, and efficient, making it easy to navigate the menu structure of the Omnia 6. Processing changes and system adjustments can be quickly made with ease without having to remember multiple controls, their positions, and what they do in each menu. The behavior of the Omnia 6's menu system is consistent across pages and is easy to learn. We believe that you will quickly become comfortable with how it works, and appreciate its simplicity.

See the diagram below to learn how each movement of the jogwheel affects the various menu options.


Clockwise rotation moves the highlighting downward through menu items, increases the value when editing parameters or raises the headphone volume
The **Enter**, **Return** or **Select** button. Pressing the jog-wheel once selects the highlighted menu item or accepts the current parameter value. Think of it as a vertical mouse button.
CW
CCW
Counterclockwise rotation moves the highlighting upward through menu items, decreases the value when editing parameters or lowers the headphone volume

Jog-Wheel Functions

Level Meters & Processing Bargraphs



The horizontal meters show digital sample-accurate peak and VU representations of the left and right input and output levels, while the vertical bargraphs show processing activity of the various algorithms. The currently selected Preset Name is displayed in the bottom left corner of the Meter Display, while the current time is displayed in the lower right corner.

Left hand LCD screen showing I/O and process bargraphs

Audio I/O Level Display

Both input and output levels are displayed in real time. The bars indicate VU while the “bouncing balls” indicate sample-accurate peak signal levels. The horizontal meters show the signal levels below full scale digital (0 dBFS), which is the absolute maximum level in the digital domain. In normal operation, the VU metering should average about -15 dBFS (-12 dBFS is approximately equivalent to 0VU in the analog domain).

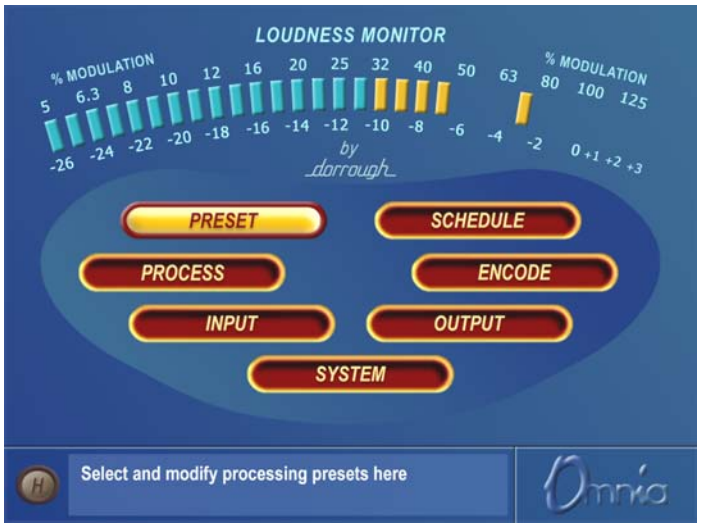
Processing Display

The thirteen vertical bargraphs in the lower half of the Meter Display show the processing activity in real time within the Omnia-6fm. The first vertical meter (labeled W) represents the processing activity in the Wideband AGC section. The five vertical "AGC" meters show the processing activity of each of the AGCs in the multi-band AGC section. The six vertical "Limit" meters show the processing activity in each of the limiter sections of the multi-band limiter. Each of the meters is capable of indicating up to 25 dB of gain reduction.

The rightmost vertical bar graph (labeled EFX) indicates the processing level of the built-in Stereo Enhancement effect, when that function has been activated.

Note: The wideband AGC and Multi-band AGCs will recover to a resting gain setting which coincides with the RTP (Return To Platform) levels set for each band. Refer to Chapter 5, “Editing Presets”, for more information on interpreting and using the processing bargraph displays.

Main Menu Display



"Home" Icon

The ***Omnia-6fm Main Menu*** is displayed on the right hand LCD screen, and offers seven menu selections: ***Preset, Schedule, Process, Encode, Input, Output, System***. Below the Main Menu in the lower left corner of the display is a multipurpose "Help Text" box.

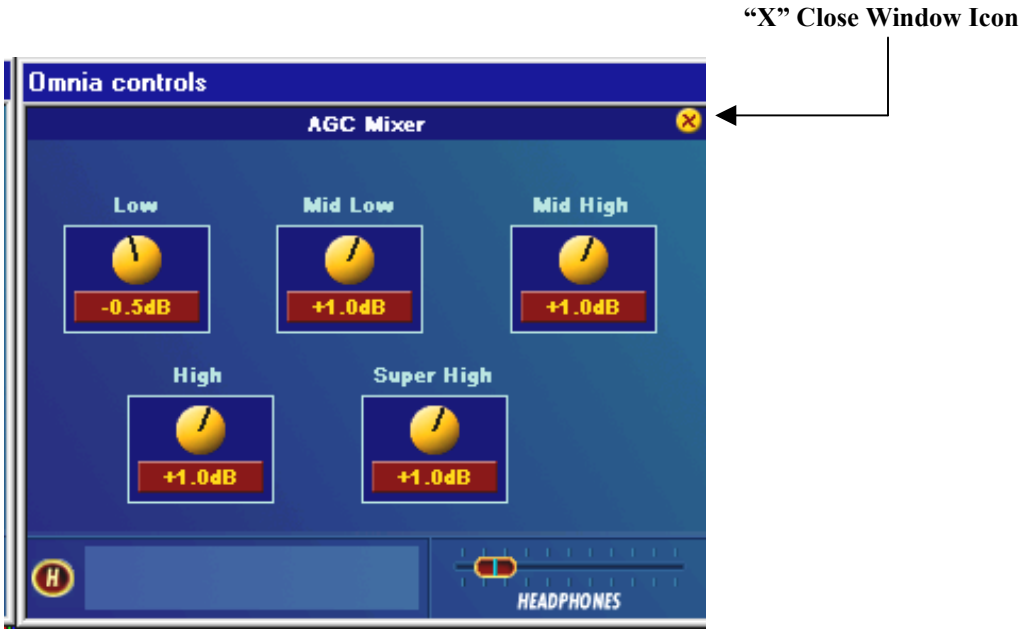
The Omnia-6fm menu system has been designed to be intuitive and simple to use, with a minimum of layered submenus. Most operating parameters are found on one of the seven main menus. This allows multiple processing changes to be made quickly and with ease.

When the Main Menu is displayed (as shown above), rotating the jog-wheel sequentially highlights each menu item. This is called Highlight Mode. With a menu item highlighted, pressing on the jog-wheel (called "clicking") brings up that item's submenu window. Similar action results when submenus are selected under these seven main menus.

Preset Submenu

The *Preset* menu item is shown highlighted in the Main Menu Screen illustration above. In this case, clicking the jog-wheel would open the *Preset Submenu window* (shown at left). To exit a submenu and move back to the main menu, highlight the "**H**" Home icon in the lower left corner, and click the jog-wheel.

In all submenus with adjustable parameters, rotating the jog-wheel sequentially highlights each control or selection choice, along with the Home icon and the Headphone level button. In the Process submenu, the parameter adjustment windows have an "**X**" Close Window icon in the upper right corner (as shown in the AGC Mixer window below). Highlighting this icon and clicking closes the window, returning the user to the Process submenu, one level above.



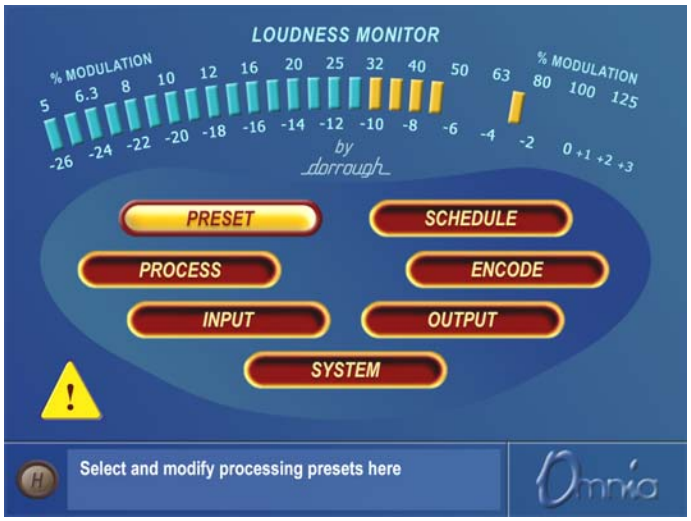
AGC Mixer Submenu

To change the selection in a multiple-choice parameter, highlight the desired choice with the jog-wheel and click. A filled box serves to indicate that a parameter choice is selected.

To adjust a "rotary" knob control, like those shown in the AGC Mixer Parameter Window, highlight the control and click. The jog-wheel now functions as a rotary control. Rotating it clockwise adjusts the control up; counter-clockwise adjusts the control down. The adjusted value is shown below the control. The original value is retained in a different color until the jog-wheel is clicked to make the new value permanent.

To cancel a control change, return the jog-wheel to the control's original value. To apply a new level or value and return to Highlight Mode, just click the jog-wheel.

Remote Control Session via Network Indicator



Omnia 6 Main Menu

An exclamation mark inside a yellow triangle will show up in the lower left corner of the Main Menu screen when a Network remote session is in progress. A remotely connected network session has priority over local control of the front panel, so during a Network remote session the Main Menu will be grayed out.

The triangle with exclamation mark signifies that a TCP/IP Remote Control session is active. There is no front panel indication shown when a serial or modem based remote control session is in progress.

Headphone Level Control

A standard ¼" stereo headphone jack located at the lower left corner of the front panel allows the processed signal to be monitored, and a Headphone volume level control is available in each submenu. When the headphone volume control slider is highlighted, clicking changes the jog-wheel into a headphone volume control. Once the headphone volume is adjusted to your liking, clicking the jog-wheel exits the volume adjustment mode, returning the jog-wheel back to Highlight Mode.

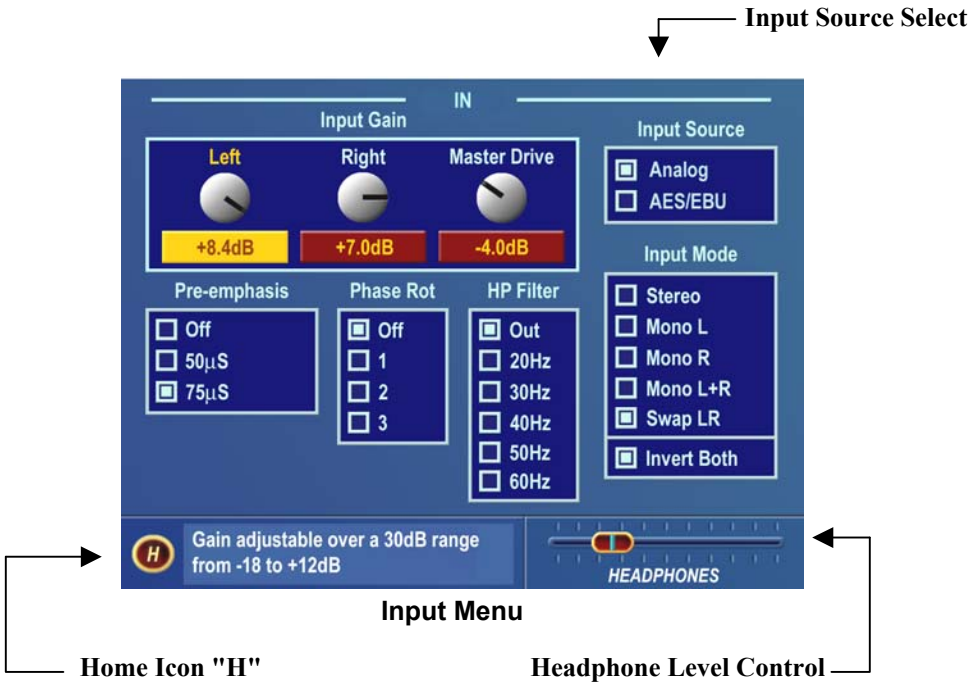
Note: The headphone amplifiers are fed from the same high quality D to A converter as the analog outputs. Therefore, the overall Headphone volume will also be affected by the setting of the *Peak Output Level* controls in the Output Menu.

User Interface Tutorial – Input Source Selection and Peak Level Setting

The following two exercises are a useful introduction to the user interface. Start from the Main Menu (as displayed when the unit is first turned on).

The first exercise changes a parameter selection (the ***Input Source*** selection):

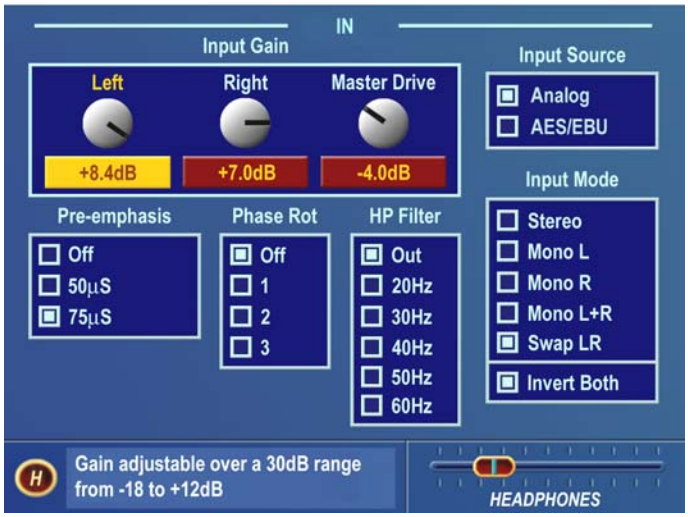
1. Rotate the jog-wheel to highlight ***Input***.
2. Click the jog-wheel (push on the wheel once) to bring up the *Input* window (shown below).



3. Rotate the jog-wheel until one of the ***Input Source*** choices: *Analog* or *AES/EBU* is highlighted. The filled box next to the selection name identifies the current selection. The factory default selection for Input Source is *Analog*. To change the selection to *AES/EBU*, highlight *AES/EBU* and click. The *AES/EBU* box will now be filled and the digital input is now active. If you are using the analog inputs, highlight *Analog* and click to reselect the Analog inputs.
4. Rotate the jog-wheel until the ***Home icon "H"*** is highlighted in the lower left corner of the window. Click to return to the Main Menu.
5. Note that as you adjust the Input Source selection in this menu, the wording above the Input level bargraph on the Meter Screen changes to follow the selected source name.

The next exercise adjusts a parameter that uses a value (the L / R ***Input Gain*** setting):

1. Highlight ***Input*** and click to open the Input window.



Input Menu Showing Input Gain Controls

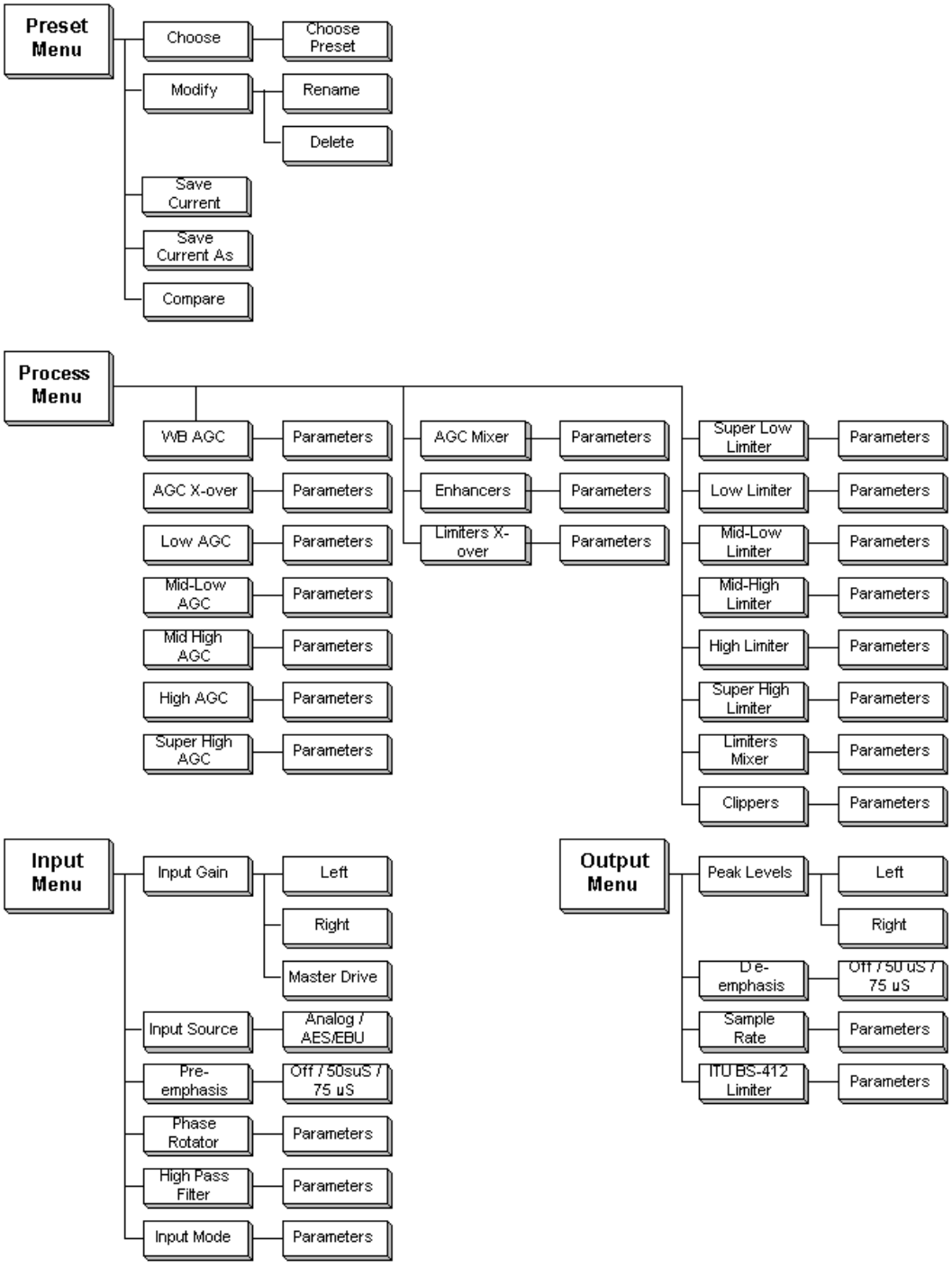
2. Rotate the jog-wheel to highlight ***Input Gain Left,*** and then click the jog-wheel to select the control.
3. Rotate the jog-wheel CW to increase the input gain. Rotate the jog-wheel CCW to decrease the input gain. The gain in dB is shown below the "control." Note that the original setting is always shown in a different color when the control is adjusted. To cancel level changes, move the control back to the original setting and click.

   Using normal program audio, a correct gain setting results in **peak** indications (the "bouncing balls") hitting -12 dBFS (where the level meters turn red) or a little higher. This corresponds to system headroom of 12 dB. You may adjust for more headroom if you wish (lower indications), but setting the input level for less headroom (higher meter indications) is strongly discouraged.
4. Once the desired gain is reached, click the jog-wheel to accept and use that value. This returns the jog-wheel to Highlight Mode.
5. Highlight and click ***Input Gain Right*** and adjust it as in steps 3 and 4. Unless the input source is not balanced, both Input Gain controls should be adjusted to the same value.
6. Rotate the jog-wheel until the ***Home icon*** is highlighted. Click to return to the main menu.

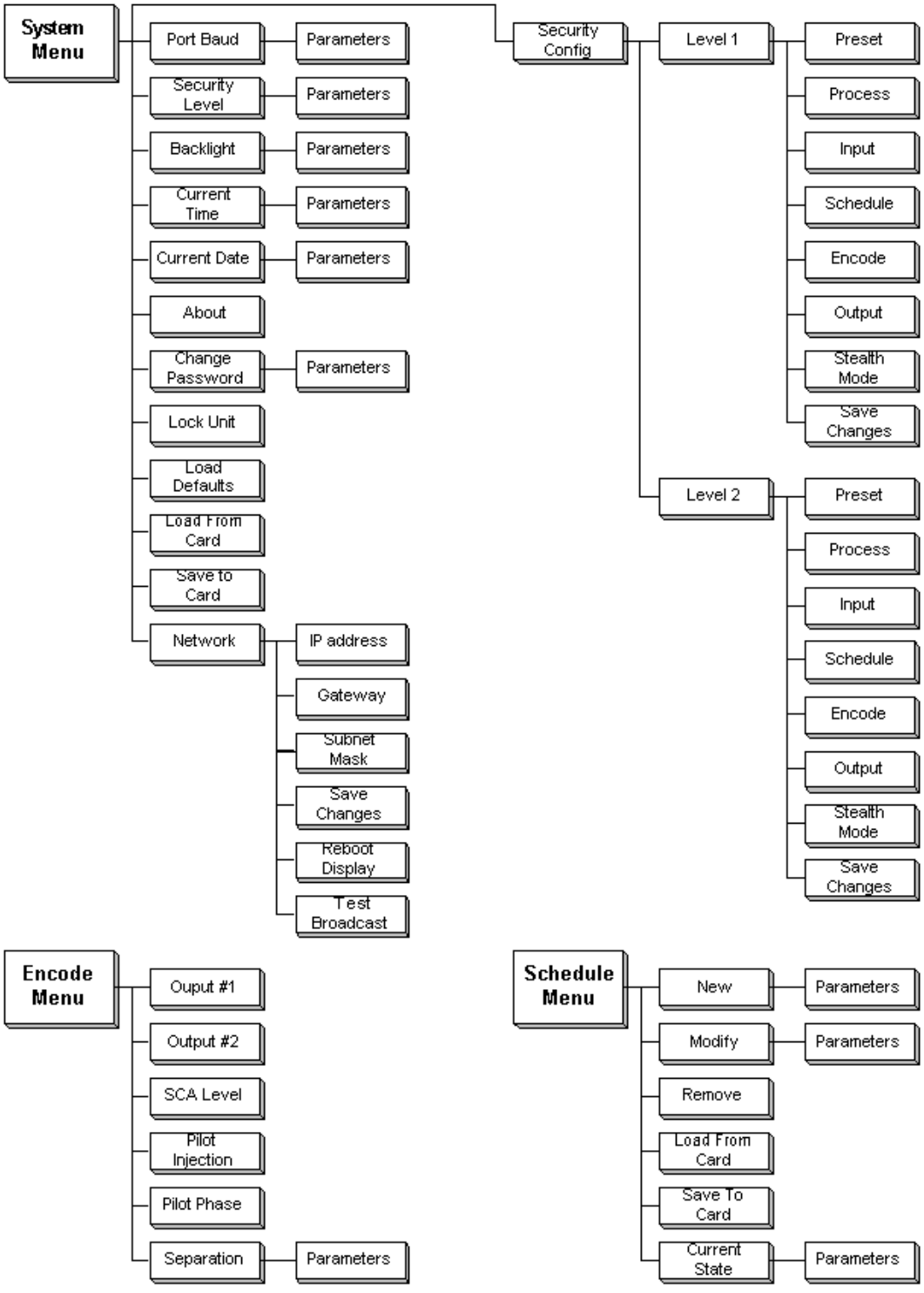
All of the Omnia-6fm's software parameters are set in a similar fashion using the jog-wheel in Highlight Mode to scroll through menu items and parameters. Clicking a highlighted item selects it; when that item is a control, the jog-wheel adjusts the value or level. Clicking accepts the value or level and returns the jog-wheel to Highlight Mode. **Note:** Changing any parameter value changes the Omnia-6fm's audio output characteristics in real time so that all adjustments can be auditioned as they occur.

The Menu Tree

The menu tree for the Omnia-6fm is shown in the following two pages. The seven main menu items are **bold** for clarity, with their branching parameter choices shown in the order in which they are encountered in the menu system. The first four menu options and their branches are shown below:



The next three Menu Options are shown below along with their associated branches:



Menu Items

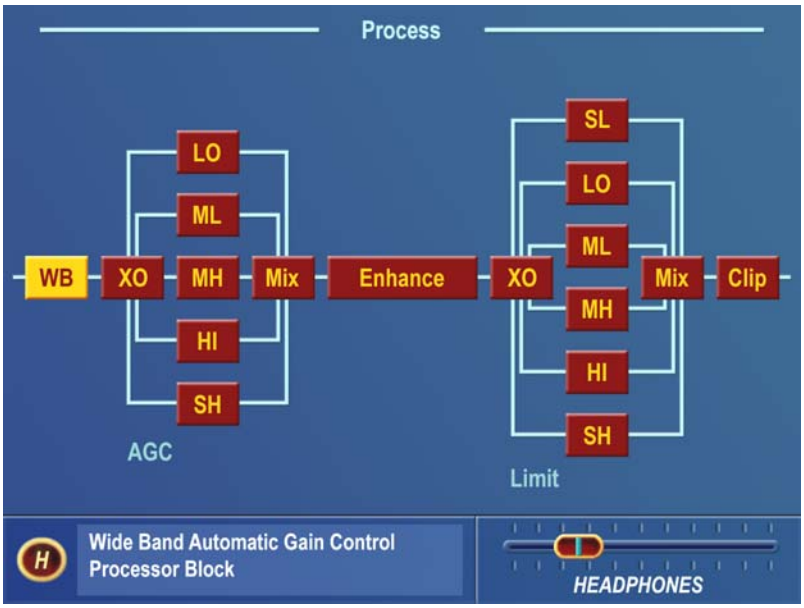
This section presents an overview of the seven submenus (***Preset, Process***, ***Input, Output***, ***Encode, Schedule*** and ***System***) and their parameters. The *Menu Selections* section, starting on page 2-6, gives in-depth descriptions and usage instructions for each submenu item and parameter selection.

Preset

Omnia-6fm is equipped with numerous factory presets that can be used to instantly configure the processing for common applications. Highlighting *Preset* and clicking the jog wheel will open the Preset submenu. Appearing here is a list of all of the presets stored on the Omnia PC Card. Highlighting a Preset and clicking "Choose" allows that preset to be loaded into the Omnia-6fm, instantly setting the various processing parameters. You may also compare and modify settings between presets, save the current processor settings to an existing or new user preset, and rename or delete user presets using options found on this submenu.

Process

Highlighting and clicking *Process* opens up the Process submenu, shown below:

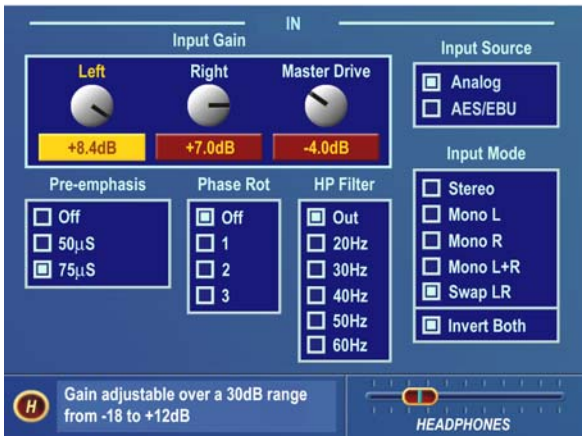


Process Submenu showing Processing Signal Chain

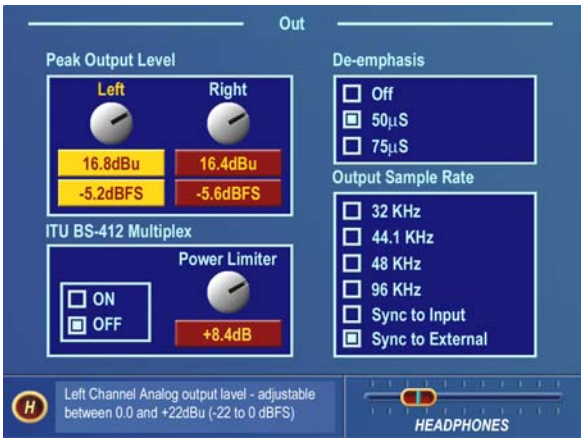
This is where the processing power of the Omnia-6fm can be fine-tuned, and your station's individual sound customized. Each processing subsection in the Omnia-6fm (shown in block diagram format) can be highlighted and clicked to open a parameter window with all of the available controls assigned to that function.

Since you cannot build a preset from scratch, a factory preset must be used as a starting point for creating your “signature sound.” Each signal processor section (from the Wideband AGC to the Clippers) can be individually selected, and its parameters adjusted as required. Once the processing is adjusted, the *Preset* menu "Save As" function is used to save your newly edited factory preset to the PC Card as a new user preset. See Chapter 5, “Editing Presets”, for an in-depth discussion of using this submenu to edit presets.

Input & Output Submenus



Input Submenu



Output Submenu

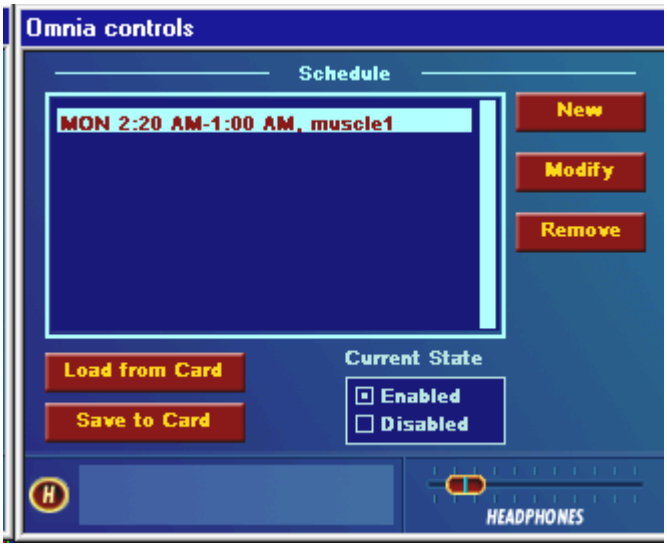
These two submenus provide level adjustments for the left and right inputs and the absolute peak operating level of the outputs. Note that the analog and digital Input and Output levels are affected equally by the settings of the Input and Output Gain controls respectively. Choices governing the selection of the input audio source (Analog or AES-3), signal mode (stereo or mono) and whether pre-emphasis and de-emphasis is applied are also found on these submenus. These are generally “set once and forget” selections or parameters, usually adjusted during installation and then left alone. In fact, they are called "System" parameters, and are not saved with a Preset. Therefore, you must save them as a System Configuration using the "Save To Card" option in the System submenu.

Encode

Encode Submenu

This submenu contains the adjustments for the DSP based Stereo Generator. The Output Levels for Composite Outputs 1 and 2, the Stereo Pilot Injection Level and Phase, and the SCA Injection Level and Stereo Separation parameters are adjustable here. Like the Input and Output menu choices, these menu items are typically adjusted during installation, and are saved as a System Configuration (see above).

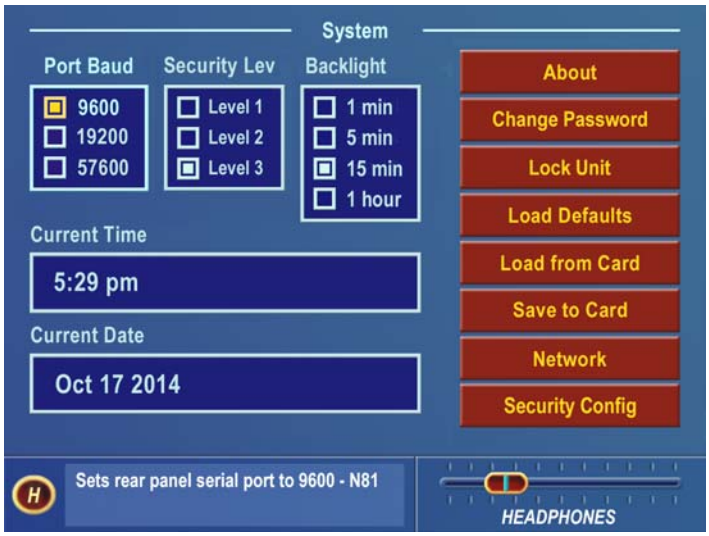
Schedule



Schedule Submenu

The Omnia-6 can automatically load presets from the PC Card by date and/or time. The Schedule submenu allows the user to enable or disable the Daypart Scheduler function, as well as to create, modify, save and recall custom preset changing schedules.

System



Numerous maintenance and utility functions are found in this submenu. *System* data is saved here, and various *Security* options are available to prevent tampering by unauthorized personnel. There are also controls for setting the serial RS-232 communications baud rate, TCP/IP networking parameters, the date, time, and the Screen Saver backlight off timeout interval.

System Submenu

An important selection under this submenu, *Save to Card*, makes a copy of the Omnia-6fm system configuration, and stores it on the rear-panel PC Card. If a power failure should occur, the unit restarts using the last saved operational settings. This means all Input, Output, Encode and System Menu settings are restored, as well as the previously running processing settings. If the system is not backed up and saved to the PC Card, then the system restores itself to the last known saved set of parameters (which will be the factory defaults if you don't use *Save to Card*!). For this reason, Omnia suggests that you backup the system using the System/Save to Card function after any custom parameter editing has been completed.

Menu Selections

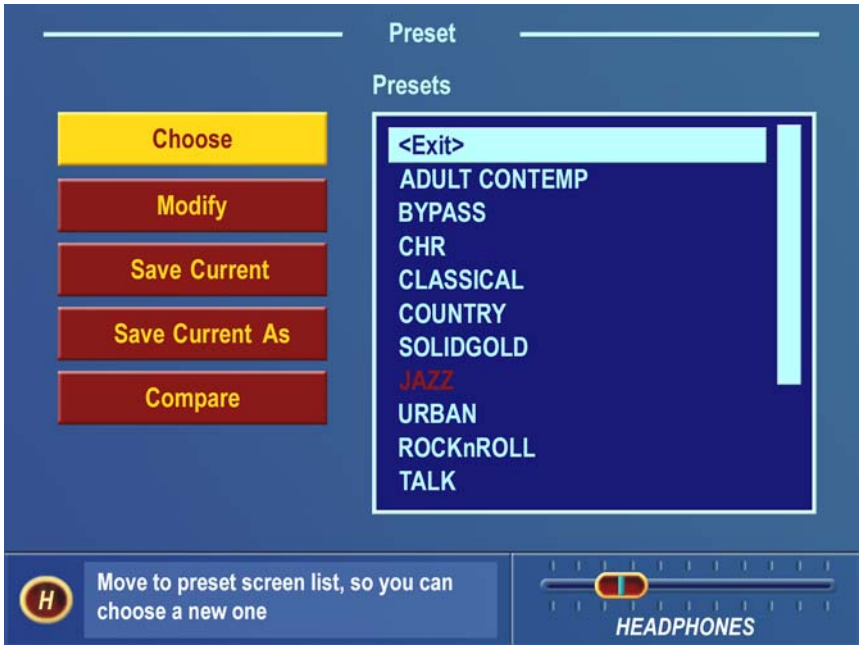
This section presents more information on each submenu window item and the parameter choices or value settings that may be available within them. See Chapter 5, "Editing Presets," for detailed information on editing processing preset parameters to achieve your custom on-air sound.

This procedure is used for all parameter selection and editing:

1. **Rotate** the jog-wheel to highlight a menu item or submenu item.
2. **Click** the jog-wheel to select that choice or item.
3. If the parameter requires a value, **rotate** the jog-wheel to adjust the value.
5. **Click** to accept the value and return the jog-wheel to Highlight Mode.

Preset

This submenu is active under Level-3 password access, or at Security Levels 1 or 2, as defined in the Security Config screen. In addition to the *Preset* name list, there are five functions available in this submenu: *Choose, Modify*, *Save Preset*, *Save Preset As* and *Compare*.



Preset Submenu

Preset List

Lists all of the presets, factory and user, that are on the PC Card inserted into the memory card slot on the rear panel of the Omnia-6fm.

Choose

To load a preset, highlight the Choose option to move the highlighting to the Preset List, then rotate the jog wheel to highlight the desired preset name and click. The processing algorithms will be updated to the new values almost instantly.

Modify

Opens the Preset List window so a user preset can be renamed or even deleted.

Save Current

Saves the current parameter settings to the PC Card, overwriting any previous settings saved under the currently running user preset. If the current preset started out as a factory preset but you changed some values, the system will warn you that you cannot save your settings directly over a factory preset name. Instead, you must select the **Save Current As** option, and assign your work a new Preset Name. After doing so, your new Preset will appear in the Preset list.

Save Current As

Opens up a window so a new preset name can be entered. Preset names can be up to 12 characters in length. Rotating the jog wheel clockwise scrolls through the capital letters of the English alphabet first. Rotating it counter-clockwise scrolls through the numeric characters first, and then through the lower case English alphabet. Click the jog-wheel to select a highlighted character to change. Then rotate the jog-wheel to step through all the possible characters. Once the desired character is displayed, click the jog-wheel to select that character. Rotate the jog wheel to select the next character and edit that as appropriate. When the last character is reached, click to accept the character and then rotate the jog-wheel to highlight the √ (checkmark) to save your preset. Highlight the X to cancel naming.

Note: While scrolling through the character list, you will see "Ins", "Del", and a blank space. "Ins" stands for "Insert", and is used when you wish to add an extra character within a preset name. The "Del" option allows you to remove a character or space from a preset name. The blank space is just that. It allows you to add a space within a preset name.

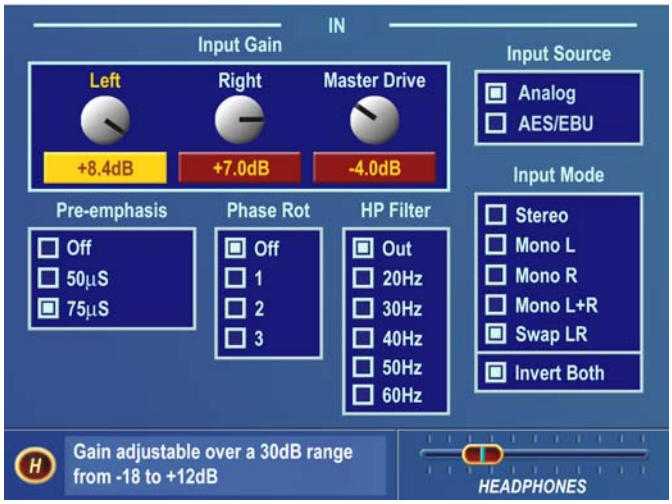
Compare

Allows two different presets to be compared. Note that preset changes can occur very quickly, but depending on the number of internal parameters being updated, the Compare process may take a second or two to fully transition from one preset to another.

Process

This submenu is a graphical block-diagram representation of the signal flow through the Omnia-6fm. Each block-diagram icon, when highlighted and clicked, opens up a parameter window that pertains to that part of the Omnia-6fm processing circuitry.

Input



Input Submenu

This submenu has seven items:

- Input Gain Left/Right, Master Drive
- Input Source Selection
- Invert Both Channels Option
- Input Mode Selection
- HP Filter Selection
- Phase Rotation Selection
- Pre-Emphasis Selection

Input Gain Left / Right

These controls set both the analog and digital input **peak** levels. For an analog signal, the control range is from -18 to +12. For digital signals, the range is from -30 dBFS (deciBels below digital Full Scale) to 0 dBFS. The factory default control setting of 0.0dB corresponds to a nominal input level of +4 dBu (-12 dBFS).

To change the input sensitivity, highlight the control and click, then use the jog-wheel to adjust the level in 0.2 dB steps. –18.0 dB has the least amount of gain; +12.0 dB is the maximum gain. Compare the setting of this control with the input bargraph meters so that signal **peaks** (the "bouncing balls") read at -12 dBFS but no higher.

Master Drive

This control, located **after** the input bargraph meters, calibrates the nominal internal level of the Omnia-6fm to match the reference level of your air chain. This control may need to be adjusted if your station's audio reference level is something other than +4dBu. It also may need adjusting if the input audio feeding the Omnia6-fm is pre-processed to reduce the peak-to-average ratio, or if you wish to bypass the *WB AGC* and have too little gain. The range of this control is –9dB to +6dB.

Note: Normally there should be 10-12 dB of nominal gain reduction in the *WB AGC* section. This will occur when a +4dBu average input level is present, the ***Left / Right*** gain controls are adjusted for **peak** input levels just reaching –12dBFS, and when the ***Input Gain***, ***Master Drive***, and ***AGC Drive*** controls are set at 0.0. If not, you may adjust the Master Drive control to achieve the desired WB AGC gain reduction value.

Input Source

Selects between the discrete Left/Right Analog input or the AES/EBU Digital input.

Input Mode

Selects how input audio is routed and processed by the Omnia-6fm. Highlight and click on the parameter selection to set the mode. The selected Mode is shown with a dot in the box next to the name. The factory default selection is Stereo. The other available modes are:

Stereo: the left and right input channels are processed separately.

Mono L: routes the Left Input only through both channels of the processor.

Mono R: routes the Right Input only through both channels of the processor.

Mono L + R: sums the stereo input to mono and processes the summed audio.

Swap L / R: swaps the Left and Right Inputs.

Invert Both: if the absolute phase of the Omnia-6fm is different from your existing system, it could cause your announcers to think they sound "weird" when speaking while monitoring through headphones. If this happens, the absolute phase of the Omnia-6 may be different from what your announcers are used to. A quick way to remedy this is to highlight ***Invert Both*** and click to select. A dot in the box indicates Invert Both is active.

High-Pass Filter

In most FM systems, subsonic frequencies should usually be rolled off to prevent difficulties with certain exciters and STL systems. The Omnia6-fm has a third-order (18dB/Octave) high pass filter with five selectable cutoff frequencies from 60 Hz down to 20 Hz. The factory default is "Out", which means that frequencies down to around 2Hz are passed through the system without attenuation. You may select one of the other values that may be more appropriate for your system.

Phase Rotator

This section consists of three cascaded second order 200 Hz allpass filter sections. Phase Rotators (also known as Phase Scramblers) are commonly utilized to make asymmetrical waveforms (such as voice) more symmetrical. This ensures that clipping occurs equally on positive and negative peaks, making better use of the symmetrical nature of FM modulation. Phase rotation can make talent voice sound cleaner, but since it disturbs the phase integrity of musical signals, music might sound more faithful to the original source if phase rotation is reduced or not used at all. The four available settings (*Off, 1, 2, 3*) allow you to select how many sections (if any) are active. Selecting higher numbers will result in a steeper phase shift slope at the design frequency of 200Hz. You should always choose the Phase Rotator setting that sounds best in your system. ***Off*** can be chosen if previous phase rotation has been performed in your system (in a mic processor for example) or to preserve the phase integrity of the original program as described above.

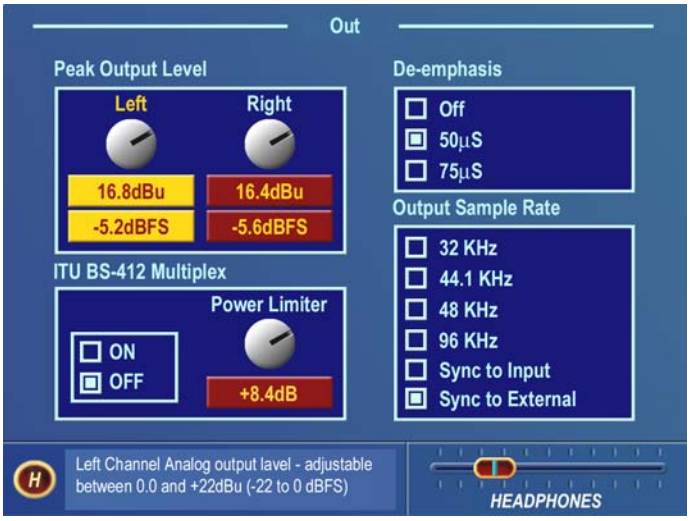
Pre-Emphasis

For the transmission side of FM broadcasting, some form of high-frequency boost, or pre-emphasis is used. The most commonly used values of pre-emphasis are 50 and 75 µs (microseconds). For North and South America, 75 µs is used. In Europe, Australia and New Zealand, 50 µs is employed. The factory default pre-emphasis setting is *75 µs*. The pre-emphasis selection affects the operation of the audio processing and is applied to the composite, discrete, and digital outputs. The pre-emphasized signal at the Left/Right and digital outputs can be restored to flat, if needed, by the ***De-Emphasis*** parameter selection.

To set the Pre-Emphasis, rotate the jog-wheel to highlight one of the three choices: *Off*, *50 µs* or *75 µs***.** Click the jog-wheel to set the pre-emphasis selection.

Note: Normally, the ***Off*** selection under the Pre-emphasis options would not be used in FM transmission applications, but is provided in instances where processing of a flat signal is desired. One example would be when preprocessing prior to a satellite uplink in distributed radio networks.

Output



Output Submenu

There are four settings under this menu item:

- Peak Output Level
- De-Emphasis
- Output Sample Rate
- ITU BS-412 Multiplex Power Limiter

Peak Output Level

The left/right peak output level adjustment is done in a similar manner as the setting of the input levels. These level settings take place in the digital domain and before any D/A converters. Therefore, the output level settings affect the digital (AES/EBU) output, and the analog outputs including the headphones. The control range is from 0 dBu (-22 dBFS) to +22 dBu (0dBFS) **peak** output level. This level is normally set to the maximum input level, or just below it, of the device that the Omnia-6 is driving (STL, transmitter, etc.).

De-Emphasis

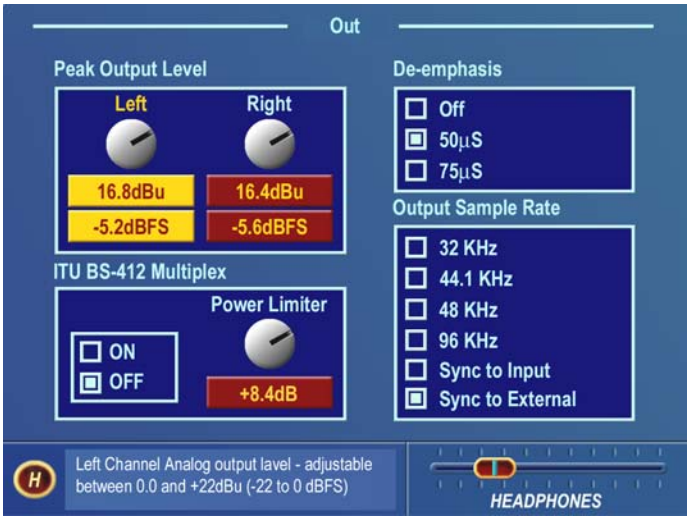
The Left/Right outputs are pre-emphasized under normal circumstances, such as when feeding an outboard stereo generator or discrete microwave studio-transmitter link. The same applies when feeding a digital exciter from the AES/EBU output. These outputs can also be de-emphasized for installations that require a flat frequency response, as is the case when feeding other types of studio to transmitter links. The factory default de-emphasis setting is *75 µs*.

To change the De-Emphasis setting, rotate the jog-wheel to highlight one of the three choices: *Off*, *50 µs* or *75 µs*. Click the jog-wheel to set the de-emphasis selection. If choosing a de-emphasis time constant, be sure it matches the pre-emphasis time constant. Bear in mind that if Pre-Emphasis is turned on, selecting *De-Emphasis Off* means that the outputs will be pre-emphasized. **Note:** The *De-Emphasis* setting does not affect the composite output, which always follows the *Pre-Emphasis* setting.

Note: The headphone output is automatically appropriately de-emphasized when any value of pre-emphasis is being used.

Output Sample Rate

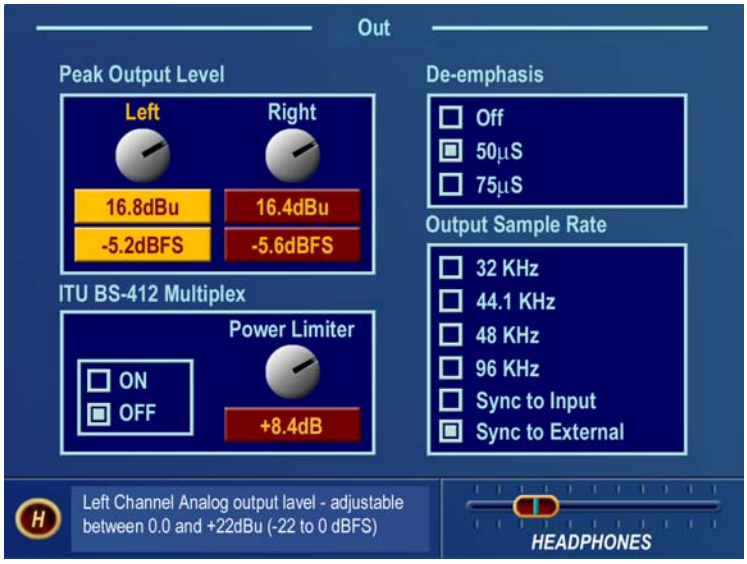
One of four standard digital sample rates (32, 44.1, 48 and 96 kHz) can be selected. The output sample rate can be set to follow the incoming sample rate on the digital input, or it can be set so that it locks to the External AES Sync Input sample rate.



Output Menu showing Output Sample Rate Selections

Multiplex Power Limiting

In certain parts of the world, the power of the overall multiplex signal must be controlled to prevent or reduce adjacent channel interference to closely spaced stations. The currently enforced standard falls under the ITU BS-412 regulations. The Omna6-fm has a very effective Multiplex Power Limiter algorithm that may be enabled to comply with these regulations.



ITU BS-412 MPX Limiter Controls

For European countries that require it, the proprietary Omnia 6 Multiplex Power Limiter maintains the average multiplex power as required by regulatory agencies. The algorithm will maintain the average multiplex power from 0.0dB to +9.0dB (in 0.25dB steps) above the original 0.0dB ITU BS-412 standard. The default setting is ***Off***.

Loudness Loss Warning!

If your country's regulatory agency does not require the use of the ITU BS-412 Multiplex Power Limiter, make certain that the BS-412 Power Limiter is set to **off**, or severe loss of loudness will result! For example, when the ITU BS-412 Power Limiter is switched on and set at 0.0dB, there is approximately a FIVE dB loudness loss over the limiter being switched off!

Encode

Encode Submenu

Six parameters are set under this submenu:

- Composite Output 1
- Composite Output 2
- SCA Level
- Pilot Injection
- Pilot Phase
- Stereo Separation

Composite Output 1 & 2

These controls individually set the level at the two separately buffered rear-panel composite outputs. The output level adjustment range is between 1.25 and 9.5 volts peak-peak. Use the jog-wheel to select the modulation level for each composite output. Once the desired peak modulation level is displayed, click the jog-wheel to set the level and return to Highlight Mode.

Always use typical program material and a calibrated modulation monitor to properly set modulation. To aid quick adjustment, it sometimes helps to advance the Clipping control before adjusting the composite outputs. Note that reference line-up tones applied at the Omnia6-fm input cannot be used since the RMS level of a steady state tone does not *crest* at 100% modulation.

SCA Level

Sets the SCA subcarrier deviation level. This adjustment should always be done using a calibrated modulation monitor.

Note: Adjusting the ***Composite Outputs*** changes the SCA deviation level since the two output controls are effectively in series. Always recheck the *SCA Level* adjustment after making adjustments to the *Composite* outputs.

Pilot Injection

Sets the pilot level from 6% to 12%, in 0.1% steps, relative to 100% modulation. To defeat the pilot, simply adjust the Pilot Injection control below 6% and the control indicates **Off**.

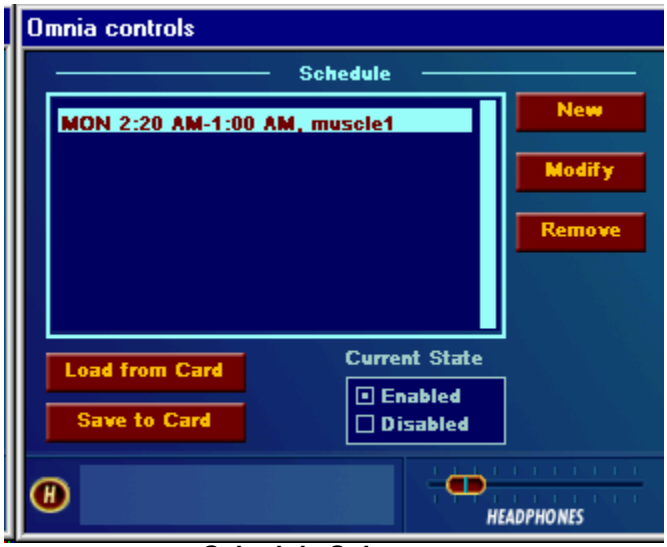
Pilot Phase

This parameter sets the phase relationship between the 19 kHz pilot and the 38 kHz suppressed carrier. The system default is 0.0º. The performance of the DSP based digital stereo generator is theoretically perfect, however should the phase need adjustment in order to offset time domain errors in the overall transmission system, the pilot phase can be adjusted ±32º, in 2º increments. We recommend that a calibrated modulation monitor be used for this adjustment. If one is not available, the tried and true "bow tie" method using an out-of-phase 100 Hz tone will suffice. If you are not familiar with this method, contact Omnia tech support for details.

Separation

The stereo "soundfield" can be reduced by 3 dB or 6 dB to suppress processing-induced multipath that can occur in certain terrain and within certain transmission systems when heavy processing is used. When a setting of -3 dB or -6 dB is used, the amount of L-R (perceived stereo effect) is also reduced. However in difficult RF signal coverage areas, the amount of perceived multipath is reduced as well, resulting in the perception of a much cleaner overall signal with better penetration and coverage. The Omnia-6 defaults to a setting of *Stereo*, using the full L-R signal. We suggest that you leave it in that mode, but the other settings are available for those who wish to experiment, including a setting of *Mono*.

Schedule



Schedule Submenu

This submenu allows you to create and maintain Schedules (Daypart Tables). A schedule is used to automatically load or change presets according to the day and/or time of day. The start day can be any specific day of the week, weekdays (M-F), weekends (S-S), or every day (All). All dayparts must end within a 24-hour period. Over 450 individual events can be programmed within a 7-day interval.

Schedule List

Previously saved Schedule files are listed in the window. To select a schedule, highlight and click on the schedule name.

New

Used to create a new Schedule. Highlight and click on ***New*** to open the Modify Schedule window and create a new Daypart Schedule.

Modify and Remove

Used to modify or remove an existing schedule. Highlight and click on the Schedule List, then highlight and click on the Daypart Schedule you wish to modify. Highlight and click on ***Modify*** or ***Remove***. ***Modify*** will open up the Modify Schedule window and allow you to modify the settings of the selected daypart. ***Remove*** will bring up a confirmation dialog asking if you want to delete the selected daypart. Answering ***Yes*** to the prompt permanently deletes that Schedule from the system memory.

Load from Card

Retrieves Schedule/daypart data stored on the Omnia PC Card. This operation will restore any dayparts that were previously saved to the card with the ***Save to Card*** operation, described next.

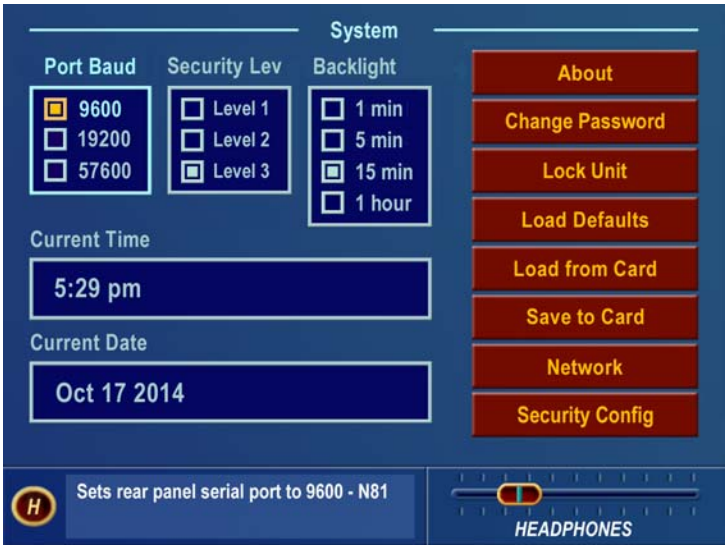
Save to Card

Stores the Schedule and daypart information on the Omnia PC Card. You might do this for safety or even for sharing the data with other Omnia-6 processors. It saves all of the currently defined dayparts and the daypart state to the Omnia PC card. These settings can be loaded later by selecting ***Load from Card***.

Current State

Turns the Schedule function on and off. When Disabled, the Scheduler runs but does not load presets. When Enabled the Scheduler automatically loads presets following the daypart schedule that is set up in the current Schedule.

System



System Submenu

This submenu allows you to perform housekeeping on the Omnia-6 operating system. Many items on this menu are available only to those having Level 3 security access. There are thirteen parameters or selections: About, Change Password, Lock Unit, Load Defaults, Load from Card, Save to Card, Network, Security Config, Current Time, Current Date, Port Baud, Security Level and Backlight.

Port Baud

This option sets the rear panel RS-232 communications port parameters between 9,600 baud, 19,200 baud and 57,600 baud. The factory default is 19,200 baud.

Security Lev(el)

It is advisable for the user interface to be password-protected for controlled access. There are three levels of password protection:

In levels 1 and 2, the visibility of each submenu (except System) can be set in the Security Config screen in the System Menu.

Level 1, User, allows access only to the Menus selected in the Security Config window, parts of the System Menu and the headphone level control. The default password for this level is “user” (all lower case).

Level 2, Advanced User, allows access only to the Menus selected in the Security Config window, parts of the System Menu and the headphone level control. The default password for this level is “advuser” (all lower case).

Level 3, Master or Engineer level, allows access to all submenus. The default password for this level is “engineer” (all lower case).

There is also a "Stealth Mode" option available, which when selected, suppressed the gain reduction metering and the current Preset Name when the Omnia6-fm has been locked. The I/O metering continues to function normally, and the currently running Preset Name is replaced by the text "System is Locked".

It is advisable to change the passwords once the Omnia-6fm is installed. Passwords are case sensitive and can contain up to ten characters.

Backlight

This setting determines the time it takes for the LCD screens to turn off after the last time the jog wheel has been used. The selections are 1 min, 5 min, 15 min or 1 hour. To preserve the life of the LCD backlight, there is no option available for continuous operation.

Set Time

Sets the current time for the unit, which must be set before dayparts can be used. The time is set using the familiar "turn and push" action of the jog-wheel.

Note: The time can be synchronized to ":00" seconds by pressing the jog wheel in synchronization with the seconds indicator of an external clock. To maintain accurate dayparting, you should periodically reset the internal clock to your external reference. The Real Time Clock IC used in the Omnia6-fm typically has an accuracy of better than +/- 0.5 minutes per month.

Note: An additional menu will prompt you to set the unit to Daylight Saving or Standard time.

Set Date

Sets the current date, which needs to be done before daypart scheduling can be used. The date is set using the familiar "turn and push" action of the jog wheel.

About

Displays a window listing the system software versions that are currently loaded and running.

Change Password

Opens up a window so that the selected Security Level password can be changed.

The factory default passwords are:

Level 1 – **user** (all lower case)

Level 2 – **advuser** (all lower case)

Level 3 – **engineer** (all lower case) Level 3 is the MASTER level with unlimited access.

To change a password, use the standard click and turn of the jog-wheel to select the character position you wish to change and to select the new character for that position.

After entering a new password, highlight the **checkmark** and click the jog-wheel to save the password. If you wish to cancel the operation, highlight the "**X**" and click the jog-wheel.

Lock Unit

Highlight and click to immediately lock the unit. A dialog box is presented for password entry to unlock the unit.

Note: You can only unlock the Omnia-6fm at the same or higher access level than it was at when it was locked. In other words, if the unit was locked while at Level 3, then only the Level 3 password will unlock the unit. If the unit was at Level 2 when it was locked, then either the Level 2 or the Level 3 passwords will unlock it. When the unit is locked at Level 1, then any password will unlock the unit.

Caution: Do **not** assign the same password to multiple security levels! You will lock yourself out of the unit!

Resetting the Omnia 6 Passwords to their Factory Defaults

Note: If you do manage to lock yourself out or you have simply forgetten your password, Omnia Technical Support can assist you in unlocking your Omnia-6fm. You will need to contact the Telos / Omnia Customer Focus Team to obtain a special code which will be entered into the Login Password dialog box. You will need to have your Omnia6-fm's 12-digit MAC address (found on the rear panel barcode sticker starting with 0050C) and the currently displayed Date (visible just below the Login Password dialog box.) Once presented with this information, Omnia Customer Support will give you a special code to type into the password dialog box, which will unlock your unit and restore all of the factory default passwords. Note that this special password is unique to your unit and is effective for the day on which you call Omnia Customer Support to obtain it.

Load Defaults

Reloads all of the factory default parameters into the system. This is the same as a warm boot command on a computer. All Input & Output levels and other System parameters are reset back to their factory default settings.

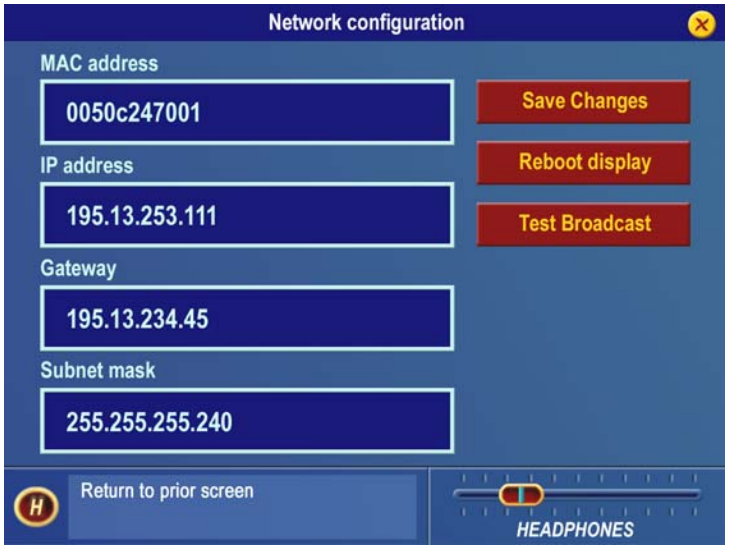
Load From Card

Allows the system settings (essentially all of the internal parameters except those in the Process Menu), to be loaded into the system from the PC Card. When this option has been selected, carefully follow the instructions presented on the LCD screen to perform this function.

Save To Card

This option creates an external file-based backup of your system settings. All parameters except those in the Process Menu are included in the System settings. Occasionally doing this is a good safety practice that creates a backup of your data; data that is also stored in the nonvolatile RAM within the Omnia-6fm. When selected, a naming dialog box appears, allowing you to name files according to the Omnia6-fm from which they originated.

Network



Opens up a window to set the Ethernet communications protocols (IP address, default Gateway and Subnet Mask info). Make sure to Save Changes before exiting this window. There are also options to allow you to Save Changes to the network settings, Reboot Display (front panel only), and send a Test Broadcast packet out to the connected network.

Network Submenu

MAC Address

The factory assigned, twelve-digit, hexadecimal hardware address of the Omnia 6 Ethernet interface.

IP Address

The customer assigned TCP/IP address of the Omnia 6 Ethernet interface. See your IT department if you aren't certain how to configure this parameter.

Gateway

The gateway setting must match your network gateway. See your IT department if you aren't certain how to configure this parameter.

Subnet Mask

The subnet mask setting must match your network gateway. See your IT department if you aren't certain how to configure this parameter.

Save Changes

After changes have been made to the network configuration, they must be saved in order to be able to be recalled at next power up.

Reboot Display

After network changes have been saved in the above step, the front panel must be rebooted in order to make the changes active in the network hardware.

Test Broadcast

The Test Broadcast button sends a series of UDP packets out over the network interface. The message contained in the packets is "An Omnia Broadcast Datagram". These test packets may be used to troubleshoot routing and other issues on the customer's network.

Security Config

Under the Security Configuration screen you can assign what submenus may be accessed at password Levels 1 and 2, the lesser security levels. The Level 3 security level is the Master security level, and ALL submenus and functions may be accessed at that level.

Security Config Submenu

The **"Stealth Mode When Locked"** option causes the front panel processing bargraph metering to stop showing processing activity, and the selected preset name to be hidden from view when the Omnia is locked. Note that the Input and Output meters are still active in "Stealth Mode".

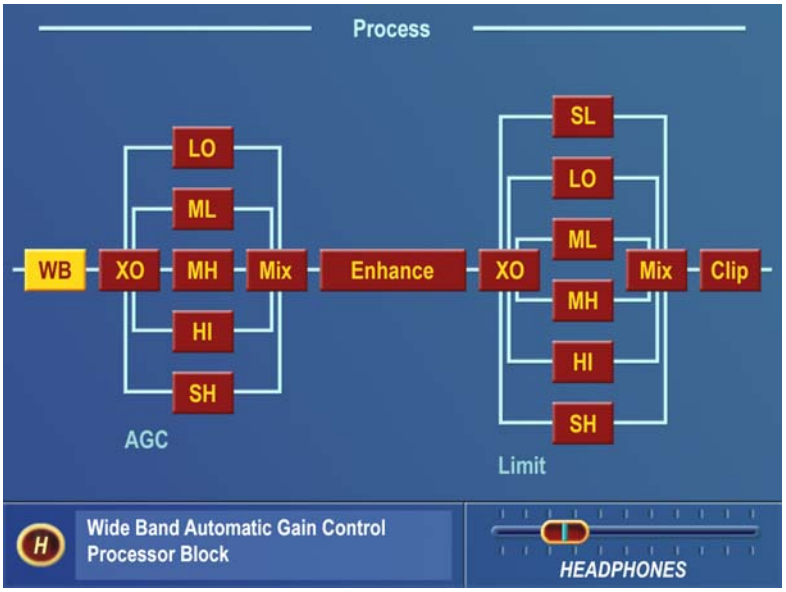
This page intentionally left blank to maintain pagination

Chapter 3

The Omnia-6fm and Audio Processing

This section presents an overview of the Omnia-6fm processor. Refer to the block diagram shown on the Process submenu to provide a functional order to the various processing sections. **Note**: More detailed technical information about the audio processing employed in Omnia-6 can be found in the Technical Papers section on the Omnia web site (www.omniaaudio.com).

Your Omnia-6fm comprises nine general processing sections as shown below.



Process Menu Block and Signal Flow Diagram

Following is a list of these sections, followed by an explanation of their functions. The name of the process block as displayed on the Omnia 6 menu is shown in parenthesis.

1. An input Wideband AGC circuit for initial level control (WB),
2. A five-band cross-over (XO) for…
3. A five-band AGC (LO, ML, MH, HI, SH),
4. A mixer circuit (Mix) to combine the signals from the five-band AGC,
5. A bass and stereo enhancement section (Enhance),
6. A six-band crossover (XO) for the limiter sections,
7. Six limiters (SL, LO, ML, MH, HI, SH),
8. A final summing mixer (Mix), and

9. Multiple clipper stages (Clip) at the output.

Wideband AGC: A very flexible wideband leveler section provides smooth, transparent control of the input program. This is achieved through two significant Omnia innovations, a dual referenced release gate and a hidden, intelligent “makeup” gain algorithm. The dual gate reference is a unique process that correlates the dynamics of the audio input signal to a “rolling” reference level, and from that information makes conditional decisions affecting the character of the release function.

A user-adjustable Make-Up Gain feature incorporates a hidden control signal that determines when the amplitude of the input program suddenly falls to a reduced level. It then adjusts the side chain gain in order to “fill in” the softer program passages so that the average level is increased. This allows the AGC function to operate with slower time constants, while significantly increasing the average audio level. These slower overall time constants yield lower intermodulation distortion, contributing to Omnia's trademark sound.

Using Classical music for an example, the orchestra often plays *forte*, and then enters abruptly into a quiet passage. Conventional AGC algorithms would hold the softer passage down until it was able to slowly recover at the static release time setting, making such passages nearly inaudible at normal listening levels. Omnia-6’s *makeup gain* function allows a hidden, faster time constant to provide quick recovery, but *only during the softer passage.* As soon as the orchestra starts to play louder, the “makeup” time constant yields control back to the primary AGC circuit, returning gain to the previous platform level. This sophistication preserves the dynamic integrity of the signal while greatly enhancing the listenability of the program.

A built-in, multi-stage phase rotator ensures symmetrical clipping of positive and negative peaks, making better use of the symmetrical limitations of the FM medium. (This feature may be defeated for a more musically transparent sound at the expense of possibly increased distortion on certain voice material.)

Phase Linear, Time Aligned Crossovers: Most multiband audio processors make a compromise in the crossover area in order to provide a flat dynamic frequency response. This is done to avoid audible peaks or dips in the recombined frequency response as the individual band gains change during processing. In an effort to minimize this problem, most processors use a fixed phase-offset in the crossovers. While such treatment helps to minimize frequency response peaks and dips, it also results in a loss of phase linearity, increasing "smearing', and reducing musical clarity.

In Omnia-6’s DSP implementation, the crossover networks are carefully time-aligned so that the recombined spectrum remains flat, regardless of the amount of gain control being applied within any band. This true phase linear response assures that harmonic overtones are not displaced in time. The result: the truer, more natural, and more musical Omnia sound.

Additionally, Omnia-6fm features separate crossovers for the multiband AGC sections. The AGC crossover section features user adjustable crossover frequencies (exclusive to Omnia), while the limiter section contains its own six-way crossover with factory optimized non-adjustable crossover frequencies.

Five-Band AGC: Similar in character to the wideband AGC described above, but expanded to five bands, this section has the ability to significantly add power and loudness to the audio while tailoring and pre-processing it for delivery to the enhancement and multiband limiter sections. Each of the four crossover frequencies has five user-adjustable settings.

Enhance: This section contains the Bass EQ and Stereo Enhancement controls. In the Omnia-6fm's unique signal processing architecture, these controls are placed in their optimal position — between the multi-band

AGC and Limiter sections.

Deep Bass EQ: For those who demand *thunderous* bass. Up to 12 dB of "thunder" can be added to shake your listeners' walls! This is not merely a simple bass EQ, but a sophisticated concept which considers the time alignment of low frequencies as they pass through the entire system. This allows loud, clean, thunderous low end, with no sacrifice to the overall loudness of your signal. Deep Bass is a shelf boost at 85 Hz that utilizes a phase linear 12 dB per octave slope to produce the shelving EQ function.

Phat Bass EQ: Phat Bass is a unique enhancement that adds filtered harmonics to the bass frequencies, carefully weighted to deliver its effect during the initial rise time of the low frequencies. Low frequency texture is emphasized with this control; the resulting effect is that older recorded materials sound fuller (or "phatter") with the illusion of added loudness. The pleasing low frequency harmonics generated by the Omnia's Phat Bass algorithm helps your station sound bigger and fuller on radios with smaller speakers, such as portable or desktop radios. This gives your listeners the illusion of deeper bass response from their radios than they're actually capable of.

Warmth EQ: The Warm Bass parameter is a second order shelf boost with a corner frequency of 150 Hz. Warm Bass compensates for program material that is naturally lacking in upper-bass punch. The parameter is adjustable over a 6 dB range.

Stereo EXP: This is a DSP stereo enhancement effect that enhances the stereo soundfield without unwanted side-effects such as unnatural imaging or exaggerated multipath. Program audio previously lacking in stereo width will have noticeably increased ambiance and dimension when Stereo EXP is active. Vocals stay up-front and the sonic details of musical instruments are heard with an apparent slight loudness increase when listening in stereo. The stereo width is automatically controlled to avoid over-enhancement.

Multiband Dynamic Peak Limiter: Not just simple limiter sections using single time constants, but rather a sophisticated series of processes which make adjustments based upon the "peak weight" of the signal. These advanced algorithms rely upon *peak-weighted* calculations to determine the strength of a transient peak, which then determines if very fast dynamic control is required. Faster time constants are used only when necessary, and then only under certain conditions that are dictated by the density of the signal. A built-in release *Hold* algorithm allows the limiter to rest momentarily in order to reduce IM distortion.

For maximum clarity and punch, the system uses different algorithms for each of the bands: The super low, low and mid low bands use a *feedback* limiter configuration, producing a larger, warmer sound on the lower frequencies. The mid high, high and super high bands utilize a *feedforward* limiter design that maintains a more open, natural and musical texture on higher frequencies. The user may adjust the individual limiter thresholds, their hold threshold values, as well as each band's attack and release times. The limiter behavior has been optimized by fixed crossover frequencies of 85Hz, 330Hz, 1kHz, 3kHz, and 7.5kHz.

Non-Aliasing, Distortion Controlled Final Limiter/Clipper: Typically, the clipper section is where previous attempts at DSP-based clippers have failed. The term "digital grunge" and "that digital sound" came from early DSP based attempts at simple peak clippers. Omnia-6's proprietary DSP-based clipper algorithm generates no in-band aliasing artifacts, and reduced audible processing distortion while producing a clean and very loud signal. Users have reported that this implementation exceeds the "smoothness" of a well-designed analog limiter! Parameter adjustments include *Clipper Drive*, *Bass Clip Threshold*, *Clipper Silk* and *Composite Clipper Drive*.

Stereo Generator / Encoder : **A**ll-digital numeric implementation - theoretically perfect performance is

approached. Stereo separation is typically greater than 65 dB. Suppression of the 38 kHz carrier is greater than 75 dB. User parameters include *Separation*, *Pilot Phase*, *Pilot Level* and *Composite Output Level*.

Selectable Composite Clipper with Phase Linear Composite Low Pass Filter: This feature is useful for those who wish to "turbo-charge" their FM signal. This clipper is specially designed to not interfere with the 19 kHz stereo pilot. There is also a digital implementation of the *Dividend* Composite Filter, which allows composite processing to be used without generating any harmonic content in the SCA spectrum. With 3 dB of composite processing employed, all content above 53 kHz is suppressed by 75 dB. This precise spectral management contributes to loudness, ensuring that no wasted energy is transmitted.

New in Omnia-6fm is a pilot notch filter to protect the pilot region from clipper artifacts. The wide, deep notch helps the stereo pilot region stay immaculately clean, reducing multipath, and keeping receiver's stereo decoders firmly locked to your signal. (Some radios "look" at the pilot region to determine when to activate their blend to mono and/or high frequency roll off functions.)

Chapter 4

This chapter presents installation and operation information specific to the Omnia-6fm. A Parameters Worksheet, located at the rear of this manual, may be photocopied to record the parameter settings used for specific processing presets.

Processor Location

Believe or not, this is an important consideration! Where you choose to locate the processor—at the studio or at the transmitter—can have a profound impact on the overall performance and your stations' loudness on the dial. We present a few considerations that will aid in making this decision.

In most applications, installing the processor at the transmitter site provides a solid coupling between the processor and the FM exciter. Since there is no other transmission link between the processor and the exciter to degrade the tightly controlled peak output levels, modulation performance and therefore competitive loudness, will be maximized. The drawback to this setup is that the processor is located in what is usually a remote, acoustically noisy, and electrically unfriendly environment. Omnia6-fm remote control can be used to make processing changes from elsewhere.

If you plan to set up the processor at the studio, consideration must be given to these STL factors:

Analog STL Use

- Is the STL path a clean shot? If the path is noisy, or is plagued by fades, multipath, or other types of interference (especially if a composite STL is used), unwanted noise will be added to your signal, robbing you of loudness.
- Is the STL a Discrete or Composite system? If a discrete system is used, there must be a provision for a stereo generator/encoder at the transmitter. In that instance, it is imperative that this stereo generator/encoder not introduce any distortion or overshoot into the system. Most stand-alone stereo generator/encoders employ some form of low pass filter and safety clipper. These sections can add significant distortion and modulation overshoot if not set up properly. If a composite STL is used, the multiplexed output of the Omnia-6fm can be connected directly to the STL. At the transmitter location, the composite receiver can be directly connected to the exciter.
- Overshoots: Some analog STL systems, especially those manufactured before 1990, can generate significant overshoots due to several possible design deficiencies. Subsonic “bounce” can be caused by an AC coupled modulator/demodulator in the STL system, and this alone can cause 1 - 2 dB of lost loudness. One method of verifying that a composite STL system is free of overshoots is to connect an oscilloscope to the STL receiver and monitor the composite waveform, paying special attention to the integrity of the low frequency square waves. Of particular interest is the “square-ness” of the low frequency waveforms, and whether there is any noticeable “grass” or “peaky” looking waveforms exceeding the peak level of the low frequency signals. The top of the low frequency waveforms should look very “flat.” If the top appears to “tilt” in any manner, then there is a low frequency deficiency in the STL system. (We’d offer further information here on the “how and why” this occurs, but that could consume a whole chapter by itself!) Simply stated, the problem

could be due to either AC coupling in the STL system or "bounce" generated by either the modulator or demodulator of the STL. Sometimes it's a little of both!

If you notice any "grass" exceeding the peak level of the low frequency waveforms, there could be noise getting into the system. This can occur if the RF path is noisy due to RF signal loss. Such "grass" can also be added to the signal if the composite path through the STL system is not linear through the 53 kHz bandwidth that a composite signal requires, and this results in overshoots to the processed signal.

A simple fix for either of these two problems is to employ a composite clipper at the transmitter site. But beware: Clipping these artifacts can lead to significant audible distortion and degradation of the subcarrier region of the signal.

While the above items must be given some thought, there are many advantages to installing the processing at the studio. If the STL link is of late design and operates as designed, superior performance can be achieved, along with having easy access to the processing for monitoring and adjustment.

Digital STL Use

- If the Digital STL employs a data reduction codec (compression), we strongly recommend that the Omnia-6fm be located at the transmitter site. (See "Pre-Emphasis: Where To Insert" below.) If the Digital STL is a linear system without data compression, we still recommend placing the processor at the transmitter site. However, the Omnia6-fm can be placed at the studio if you follow a few guidelines and are willing to accept some limitations. (See "Interfacing with a Digital STL and/or Exciter" below.) In this scenario, there also must be a provision for a stereo generator/encoder at the transmitter (most digital exciters provide this function); therefore the composite clipper in the Omnia-6fm cannot be used. Many exciters include some form of safety clipper or limiter as well, but these can add distortion and unexpected overshoots if not set up properly.

Monitoring Point

Once Omnia6-fm is on the air, you should select a good acoustical location for monitoring and adjusting it. We feel that a good tuner with strong reception feeding a good set of studio monitor speakers is probably sufficient. While car radio and other "typical listener situations" are important in judging the sound of Omnia6-fm against other stations in your market, they should not be your main reference points. In addition, there should be known-accurate modulation monitor available. If one is available, connecting an oscilloscope to the composite output of the modulation monitor will further aid in observing the overshoot performance of the system.

Good, Clean Source Material

A well-respected processing colleague once said, "Garbage in produces more garbage out!" He was not wrong. If your source material is poor, or played on poorly performing playback equipment, you will not get maximum sonic benefit from your processor. Modern audio processors magnify, good or bad, whatever is present in the source material. Anomalies that you may perceive to be processing problems may in fact be source material problems that are being exaggerated by the processing. Make sure that you start out with

a good first step — good source material!

Studio Microphone Processing

This may appear trivial, but the perceived sound of "live" voices over the air can change dramatically with different microphone processing systems. There is a high probability that the sound of your on-air microphones will change when you change on-air processors. If you utilize microphone processing, you may have to readjust it to suit the operation of your new processing system. Most announcers develop a "comfort zone" with respect to how they perceive their voice on the air, especially in their headphones. When that "comfort zone" is changed or modified, a common response is that "something is wrong" with the on-air sound. Microphone processing can be a very important part of your overall station sound, but it must always work in harmony with the main on-air processing. There are many good microphone processors available, including Omnia's own ToolVox. More information on the Omnia ToolVox Mic Processor can be found on the Omnia website at www.omniaaudio.com .

An Important Word About Time Delay

A question commonly asked about Omnia-6fm is "How much time delay does it have?" The answer: "Not enough to drive your DJ's crazy!"

Certainly, there is reason for concern about the propagation delay through any digital transmission device, audio processors included. We have measured the propagation time delay, the amount of time it takes for the audio signal to travel from the input of Omnia6-fm to the output at approximately 9ms at 1khz. This is enough for a slight voice-character coloration to be audible to the person speaking, but usually not enough to be a problem for talent monitoring off the air. If there is additional delay added to the system, such as a Digital STL, the cumulative delay may become excessive and cause discomfort for the on-air talent. Real-world tests conducted by Jeff Goode in Indianapolis determined that a slight echo may begin to be heard at 10-15ms, and that anything above 25-30 ms is usually too annoying to talent for monitoring off-air.

Operating Levels

Proper system audio operating levels are a must! It is important to make certain that the input and output levels of the Omnia-6fm are set appropriately. If they are set too low, you will compromise the signal to noise ratio of the system. If they are set too high, you may run out of headroom and encounter clipping on signal peaks. In addition, operating a processor with insufficient level into an STL system can cause loss of modulation and loudness. If you are comparing the Omnia-6fm with another processor, be sure they are both operating at the same levels. Your modulation monitor is an important tool in any processing comparison, and for getting the most out of your processor.

Omnia-6fm Connections

Output Connection Options

Tests have shown that post-processing audio power in the low frequency region is so strong that it may affect the performance of some exciters. It is imperative that your exciter have a dual speed PLL in the AFC, otherwise it may unlock. If one of your processing goals includes solid, powerful bass on air, this is an important key point that cannot be overlooked or loudness will be lost due to inefficient modulation.

Output choices are:

Left/Right Analog: This option is provided for compatibility only, and is the least-recommended choice. The DSP based digital stereo generator included in your Omnia-6fm provides superior performance, and should be used instead of the one provided in the exciter.

Analog Composite: If you don't object to your airchain being partially analog, this option will provide excellent peak control and sound quality. Be sure to use good quality low capacitance coaxial cables for best performance. Typical cables may be RG-58 or RG-62 type.

AES/EBU: The selectable sampling rates in the Output Menu are provided to minimize overshoots caused by downsampling in external equipment. This option, however, cannot make up for potential sonic degradations (see "Interfacing with a Digital STL and/or Exciter" below).

The typical connection to a digital STL or exciter is through the standard, balanced AES/EBU connection. Using a shielded 110 ohm digital audio cable with appropriate XLR connectors on each end, connect the processor to the exciter. Cable length should be as short as possible, and may not exceed 100 meters (328 feet). The exciter input should be set for *flat* input, which means that the exciter is not adding any pre-emphasis to the input signal. In the Omnia-6fm Input menu set the Pre-emphasis "ON" at the correct value for your country. In the Output Menu, set the ***De-emphasis*** option to ***Off***. This ensures that output from the processor is now pre-emphasized according to the standard in use in your country. You will also need to adjust the output levels and Output Sampling Rate in the Output Menu. Since the digital exciter will be providing the stereo generator function, you must set the ***Peak Output Levels*** in the Output Menu for the proper AES/EBU discrete left/right channel levels, and also set the ***Output Sample Rate*** to the actual internal operating sample rate of the exciter.

Interfacing With A Digital STL and / or Exciter

At the time of this writing, many engineers are proponents of the *all-digital* broadcast transmission path. However, there are some key issues which must be dealt with when implementing all-digital transmission in order to preserve loudness without sacrificing audio quality. One issue concerns the sampling rate of the audio processor and that of the exciter. In order for two differently sampled systems to be interfaced in the digital domain, a neat little device known as the "sample rate converter" is used.

For instance, a device which outputs digital audio data using a 48 kHz (or higher) sampling rate can be converted *down* to a lower rate of, say, 32 kHz. Unfortunately, unless spectrum is limited to the Nyquist frequency of the lower rate, overshoots can be created, which rob loudness. Detailed information can be found in the technical papers "Critical issues and Considerations for an All Digital Transmission Path," "Digital Dynamics Processing: It's All In The 'Samples!'" and "Digital Broadcast Audio Processing:

Finally, The New Frontier" on the Omnia Tech Info web page at www.omniaaudio.com .

When using the AES/EBU outputs to drive a digital STL or exciter, your Omnia-6fm's sampling rates must be set to match the lowest internal operating sampling rate used in any device which follows the Omnia-6 in the audio chain. You will find these options in the Output Menu; available selections are 32kHz, 44.1kHz, 48kHz, and 96kHz. Failure to select the proper output sampling rate will result in generation of overshoots.

Pre-Emphasis: Where To Insert?

Most digital exciters can generate pre-emphasis within their DSP stereo generator. This is unnecessary when using an Omnia-6fm, which provides not only the proper pre-emphasis for any region in the world, but maintains excellent peak control of the pre-emphasized signal so that no overshoots occur. Using pre-emphasis in the digital exciter instead of that built into your Omnia-6 will result in degradation of performance. Here is some background in the context of operating in a complete digital environment:

- Most exciter manufactures recommend the use of their own pre-emphasis network. If this is done, incoming audio data from the processor must be *de-emphasized* before it reaches the exciter. Why perform the emphasis function twice? Also, and more importantly, if the pre-emphasis phase delay is not **exactly the same** as the previous de-emphasis in the processor, overshoots will occur. Therefore, it is far more advantageous to employ pre-emphasis only once—in the Omnia-6fm—and set the exciter to accept a *flat* input, which greatly reduces the chance of overshoots being generated. The Omnia6-fm should <u>always</u> be the standard!

- We understand why the exciter manufacturers provide these pre-emphasis options; it has to do with digital codec STLs. Research has shown that pre-emphasized audio routed through a codec is not very *friendly* sounding. Hence the de-emphasis in the processor, and second pre-emphasis in the exciter. This is, in our opinion, a poor solution to the problem. If you *must* use a codec STL, locate the processor at the transmitter. Doing so completely eliminates any pre-emphasis/codec abnormalities in the processed audio, and also allows the processor to have the best possible electrical coupling to the exciter (be it analog or digital).

Hopefully this discussion has served to illuminate some of the issues involved in creating an all-digital transmission path. Should you experience any problems with overshoot or added distortion after this system is in place, you should look to the function of the digital exciter and its stereo encoder. As a reference, you can easily make signal comparisons with the analog outputs from the Omnia-6fm system, especially the composite output. Viewing the signal on an oscilloscope should reveal that the output is well controlled, with no overshoots, providing a clean baseband spectrum.

This page intentionally left blank to maintain pagination

Chapter 5

Fine Tuning Your Sound

Many broadcasters will be amazed at the dramatic sonic improvements Omnia-6fm delivers right out of the box and using one of the included factory presets. Some will want to tailor one or more of the presets slightly to create a more "custom" sound for their station. Still others will wish to really delve in and significantly modify the parameter settings to create their own unique "signature sound."

About Loudness and Listener Fatigue

If you're an audio processing expert, you'll find what we've included within the Omnia6-fm to be the most powerful tools ever. If you're new to audio processing, we recommend proceeding with caution and with knowledge of your goals.

Getting the most out of your Omnia-6fm processor (or any other processor for that matter) starts with knowing your objectives beforehand, and knowing where you can make tradeoffs. If your goal is to be the loudest station on the dial ***and*** obtain extreme amounts of detail and quality, keep in mind that there *are* limits. Reaching one goal is usually at the expense of the other. Thus far, we are not aware of any research or ratings information that proves that being the moment-to-moment loudest station on the dial is of any benefit to the listener. There will always be those individuals who feel that louder at any cost, is better. The added distortion from the endless and pointless pursuit of raw loudness may generate negative effects on your listeners. Be careful.

Having said all of this, we firmly believe that Omnia-6fm will get you closer to your ideal than any other processor or combination of processors available today. It is definitely capable of generating moment-to-moment loudness; it has the *muscle.* It also maintains that famous Omnia *clarity* sought after by top programmers all over the world. We encourage broadcasters to utilize the power of the Omnia6-fm to create good, *competitive* loudness while maintaining a higher degree of quality.

Clarify Your Processing Objectives

Whether one is seeking better overall quality or specific spectral improvements, try to articulate and write down your goals. Do you want a little more loudness or "presence" on the dial? Are there certain characteristics of the sound of other stations in your market that you like, want to emulate, or just surpass? Are there any you want to avoid? When adjusting processing, please give thought—real thought, to how you'd like your station to sound. What do we mean by that? Well, if your desire is to add loudness, and in most cases it probably will be, decide on the *degree* of loudness that you want. Is the goal to be *competitively* loud with respect to other stations on the dial, or must you be the *kingpin*, the moment-to-moment loudest thing known to God and Man? This will impact how you set up the processing.

Engineering, programming, and management should all participate in the development of these objectives. After all, processing can have a direct effect on the bottom line of your station. A little bit of agreement and cooperation on the goals before installation can save you a whole lot of disagreement afterwards.

Set Aside Some Time

It can take some time, a good deal of serious time to optimize the audio processing for your station. We

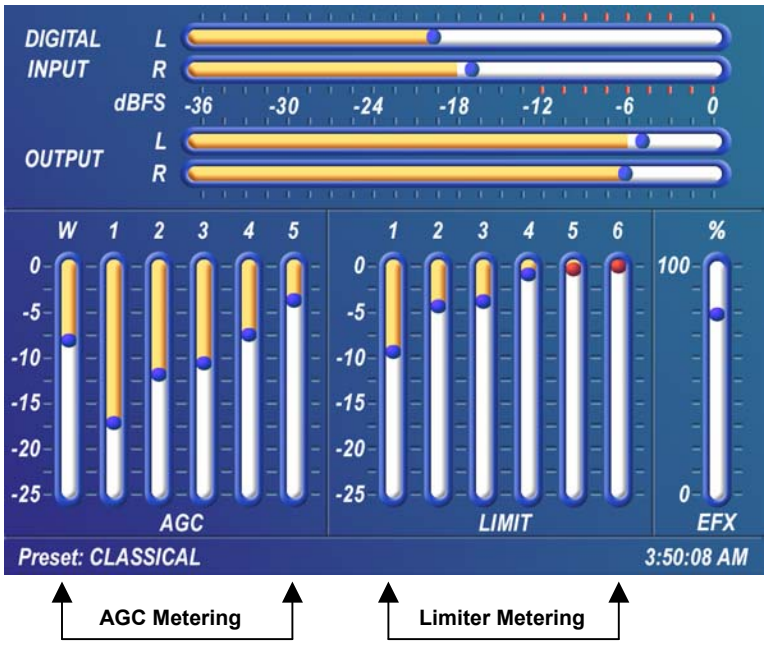
realize that in our business today, time is a precious commodity. But please don't try to install the Omnia-6fm in between other major projects or during the week your boss or your assistant is on vacation. Make certain in advance that the staff members who helped you set your objectives will be available to consult with you when you adjust the processing parameters.

How much is enough time? We feel that working with a system for at least a week is a good starting point. We don't suggest that you drop everything for a solid week. What we do recommend is that you install the Omnia-6fm during a week when you can spend a few hours per day on the project.

The Adjustment Procedure

1. Review your objectives.
2. Once on the air, start with a degree of processing that is similar to that currently used by your station and then, if desired, become more aggressive. A careful approach is less likely to draw hasty, or even negative, opinions.
3. Listen for awhile, then adjust, and listen for awhile again. Try to avoid the temptation to continuously "fiddle" with adjustments, just moments after getting the system on the air. Remember that you should evaluate the operation over time, not moment to moment! When it is time to adjust, the Preset Worksheet we've provided can assist in tracking your progress and establishing improved settings of operation unique to your stations.
4. While making changes to the system, we recommend that you do not make hasty or radical changes. Also, do not make too many different adjustments all at once. If too many parameters are changed at one time, it is hard to determine which change made the difference you may hear. That can be frustrating, whether the change made your station sound better or worse. Take your time. In order for you to become comfortable with your new sound, you should learn the limits of each control. We suggest making changes in increments of no more than +0.5 dB or - 1 dB, or in 1 or 2 step increments. Try turning different functions on and off. Working this way, you will be able to get a better feel for the sound that the Omnia-6fm is capable of producing on your station and with your programming.
5. Use the "sleep on it method:" Spend time adjusting and then listening, and when the system gets to a point where it sounds good, stop! While making changes to processing, there does come a time when the ears become less and less sensitive to the adjustments you're performing. Ears tire, and that's why spreading the adjustment period over a number of days is recommended. If what you've done still sounds good after you have "slept on it," stop adjusting. If you're not quite there yet, continue with small iterations until you're satisfied. If you are homing in on your goals, you'll find that each day the discrepancies become smaller and you're making fewer adjustments.
6. When you get it where you like it, **stop and enjoy!**

The Meter Display



Omnia 6 Main Metering Screen

In addition to the Input and Output Levels display, the Meter Display also provides processing information in the form of vertical bargraphs, which indicate both AGC and Limiter Processing activity.

AGC Metering

The bargraphs for the AGC sections can indicate up to 25 dB of gain reduction. When the "bouncing ball" indicators on each bargraph change to RED, the *Gate* function is active for that band.

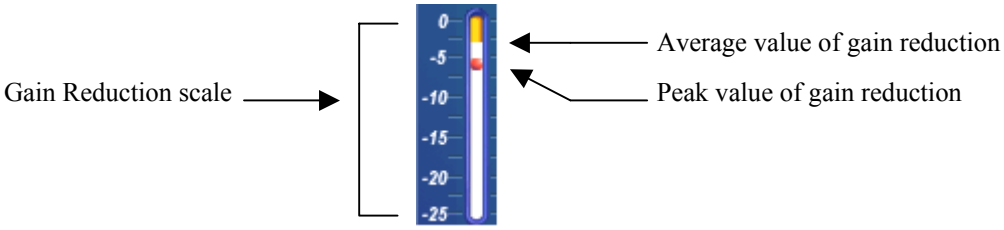
Limiter Metering

The bargraphs for the Limiter section provide a wealth of information about the peak control in Omnia-6fm. The limiter algorithms automatically adapt the style of peak control being employed on a moment-by-moment basis. This can be deduced if the metering is studied over time. During normal operation, the limiter indicators will have a dynamic "bounce" that you will be able to get a feel for. Every now and then, you will see the limiter react quickly and show a larger amount of gain reduction. Notice that the response is very fast. This action will recover very slowly, and return to "rest" with the main bargraph. This action will be easily noticed on material that is very dynamic in texture. It is partly due to this very special behavior that the Omnia6-fm has the musicality and clarity that other processors lack.

Another feature unique to Omnia6-fm is limiter "*Hold"*. During brief pauses in audio, the limiter bargraphs will "freeze" and the "bouncing ball" changes from blue to red to show the limiter has entered the *Hold* mode of the algorithm; akin to the *Gate* function in the AGCs. This is most easily noticed when there is a "dry" voice being processed. The Limiter bargraphs, like the AGC section, can indicate up to 25 dB of gain reduction.

Interpreting the Gain Reduction Meter Displays

Through careful observation of the processing bargraphs, significant information can be acquired and analyzed about the audio signal on a moment-by-moment basis. The yellow bar shows the average value of the gain reduction, while the floating ball indicates the peak value of gain reduction.



Gain reduction meter (typical)

Since the processing algorithms in Omnia-6fm 'adapt' to the audio, it is capable of performing many different processing functions at different times. The processing display bargraphs may appear to indicate different kinds of operation with different program material. This behavior is primarily based on dynamic range differences in the applied program material. For program material that is already processed or lacking dynamic range, the bargraphs will indicate differently than with material that possesses a high degree of dynamic range. This is because audio signals that lack dynamic range, naturally or by previous processing, will possess a lower peak to average ratio. Conversely, audio signals with a wide dynamic range possess a higher peak to average ratio. The Omnia6-fm adapts differently to each case.

For program material that has low dynamic range (or high RMS and low peak levels), there will be more activity in the AGC sections and less activity in the Limiters. This behavior is due to the AGC sections response to high RMS energy, while the Limiters are reacting to lower peak energy. Sometimes the Limiter section may not indicate any action at all, especially on the top three bands. For Omnia6-fm, this is completely normal! Examples of this behavior might be seen with heavily processed commercials or music, or with music passages of sustained level. A good example is the Aerosmith CD “Pump.” This recording has very little dynamic range. Try any up-tempo selection from this disk and you will see the Wideband-AGC section make initial adjustments along with small amounts of limiting. Once adjusted, the Wideband-AGC section will stay deep in gain reduction, although with little movement, and action within the limiters will be minimal.

When the programming has wide dynamic range (low RMS and high peak levels), the opposite will occur. The Limiter section becomes active, while the AGC section will appear not to respond as much. During these events, the Limiter sections could be working aggressively, while the AGC sections indicate little activity. Good examples of programming able to cause this behavior: vocal passages, live voice, classical music, and passages with high transient levels. Good test examples: almost anything classical, as well as almost anything by Steely Dan!

Also keep in mind that the AGC sections are designed to operate much more slowly than the Limiter sections, primarily because of the nature of each function. Remember that the AGC sections operate on the

program's RMS energy. During gain calculations, the incoming program's "average" level is established, and gain adjustments, if needed, are made based on those calculations. This is why the AGC sections will appear to move slower than the limiters ... they are making changes, as needed, over relatively long time periods.

The intent of the Limiter sections is to control the peak levels. This is accomplished by finding and controlling the highest peak of the audio waveform. The Limiter section's job is to quickly grab the signal, reduce the gain to the proper operating range, and then return the gain to normal until the next peak signal comes along. Peak energy must be detected and adjusted in a quick and accurate manner while, at the same time, not interfering with the sonic integrity of the audio signal. For this reason, the Limiter sections operate very quickly, with special background instructions to govern their behavior, and strictly on an as-needed basis.

Since the processing displays are capable of providing a wide range of information, we do not recommend setting up the system based on any specified meter indications. Instead, we recommend setting up the processing by using your ears to judge the sound. We've provided the meters only to analyze the signals and aid you in adjusting the specific parameters needed to achieve your desired sonic results. Like a speedometer, the meters are a guide, not the road!

Our Factory Presets Are Only Starting Points!

Numerous factory presets have been provided for you to use as starting points for customizing your stations' sound. A "preset" is simply a large table of values representing all of the control values for every control listed in the menu tree. When you *Choose* a preset, the control values are loaded into the DSP structure, reconfiguring the Omnia-6fm's processing.

Omnia/Telos does not warrant in any way that these presets are *de facto standards* for the format names that we used when we designed them. The factory presets were created as starting points, typical of the on-air sound that might be typical with such format names, but they are not engraved in stone! For instance, the technical sound of CHR stations usually varies from market to market, even though the overall playlist doesn't. Therefore, you should never assume that because we have a preset name that matches your format, that it is the best preset for your format in your market.

For example, if your station is running an Oldies format, you may want to start with the ROCKnROLL preset instead of the SOLIDGOLD preset. That's OK! Start with the preset that sounds the closest to the sound you are looking for. In some markets, our factory presets may sound too strong or aggressive. In other markets, they might not be aggressive enough. The factory presets in our previous Omnia product were judged by our customers to be about in the middle of the playing field with respect to where they needed to be to be good starting points.

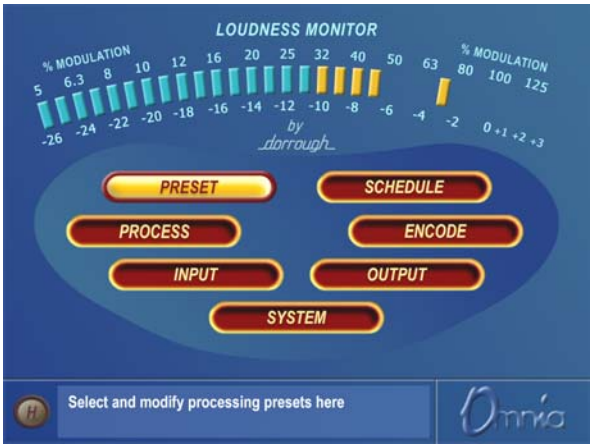
Always rely on our factory presets to get you started. Then, once you find the preset that most closely matches the sound you're after, you can customize more to your liking. All Omnia6-fm's leave the factory with the same presets. They can be used as-is, or be excellent starting points for tailoring the sound of your Omnia for a specific requirement. All of the parameters belonging to a preset can be edited using the Process Menu to obtain the sound you desire. Your edited preset is then saved to the PC Card under a name you choose, and can be reselected at any time just like the factory presets. Editing presets is covered in detail in Parameter Editing below.

Always remember that when “crafting” that special sonic personality for your station, Omnia-6fm gives you the power to create a sound that can be totally different from, and far better than that of your competitors. We've enjoyed giving you that power, and we hope that you enjoy using it!

A special preset, “PROOF OF PERF” can be loaded in order to stop all audio processing in the Omnia-6fm, while still passing signal through all of the processing sections. When this preset is recalled, the AGC, Limiter and Clipper thresholds are raised so that no signal processing takes place. The purpose of this preset is to allow the input/output characteristics of the unit to be measured, and the slopes of the input high pass filter and output low pass filters to be measured and/or verified. Note that this preset is only meant to stop processing activity so that filter slopes (such as pre-emphasis) can be verified. It does not necessarily configure the unit for the widest possible dynamic range, optimized signal to noise ratio, etc.

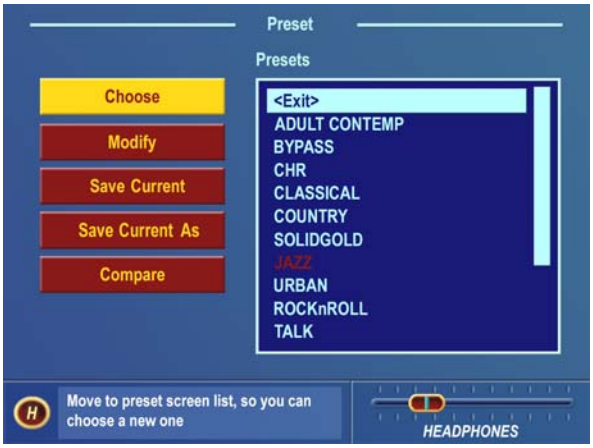
Loading A Preset

From the *Main Menu*, highlight ***Preset*** and click the jog-wheel.



Main Menu

The Preset window is then displayed:



Preset Submenu

Rotate the jog wheel two clicks clockwise to highlight the ***Choose*** option. Clicking the jog-wheel once will

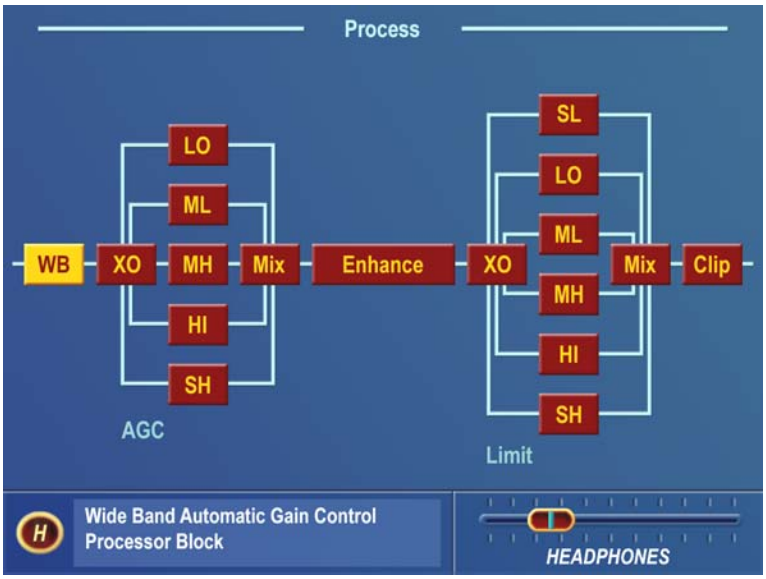
move the highlighting to the <Exit> selection in the preset name list. Rotate the jog-wheel clockwise to scroll down the list, highlighting each preset as it goes. Once you have highlighted the desired preset name, just click once to load that preset into the Omnia-6fm. To exit the preset selection list, rotate the jog wheel counter-clockwise until the <Exit> option is highlighted. Then click once.

The name of the preset that is currently loaded is always displayed in the lower left corner of the metering display screen.

Parameter Editing

The Omnia-6 system architecture has a great number of audio processing functions and features. The following sections detail the adjustments one can make.

Before tackling this section you must be familiar with navigating through the menu system and be comfortable with how the Omnia-6 jog wheel and click functions work. If so, you're ready to tackle Omnia-6's more sophisticated adjustments. To edit a preset it must first be loaded into the Omnia-6. Once loaded, it can be modified as required to suite your tastes and processing goals. The changes can then be temporarily used, or they can be saved to the PC Card so they won't be lost.



Process Submenu

The ***Process*** submenu accesses the soul of Omnia-6. This is where comprehensive adjustments to the audio processing can be made. We suggest that if you are somewhat inexperienced with audio processing adjustments, you should use care and patience while in this section. Unlike other processors, the Omnia6-fm does not limit the range of adjustments that you can make. It is essential that you know what your goals are before and during adjustments! This section of the manual will help you do just that.

Upon selecting the Process menu, a functional block diagram of the processing system appears on screen. This block diagram not only indicates the architecture of the processing system, but also provides direct access to the adjustments for each processing section. As the jog-wheel is rotated the different processing

blocks are highlighted. Clicking the jog-wheel opens up the parameter window for that processing block.

Parameter adjustment is accomplished using the previously described method—clicking the parameter to select it, turning the jog wheel to adjust it, and then clicking to save the selection and change the jog-wheel back to Highlight Mode. The following sections provide insight into each of the processing blocks and their associated adjustments.

Wideband AGC (WB)

This is the first processing section within the Omnia, so the controls in this section affect the overall signal, its density, and hence affect every other processing section following it. The job of the Wideband AGC is to erase long-term audio level fluctuations, while doing so in a very unobtrusive manner.

Wideband AGC Submenu

The ***AGC Drive*** control is calibrated between –12dB and +6dB, and adjusts the signal level into the Wideband AGC. This control should be adjusted to net approximately 12dB of gain reduction with typical programming. Too little gain reduction can defeat the “leveling” function of the Wideband AGC. Too much gain reduction has little additional benefit. Nominal gain reduction values for the Wideband AGC are between 10 and 15dB.

The ***Attack*** and ***Release*** controls set the Wideband AGC time constants in relative terms using the numbers 0 - 7. Lower numbers are slower time constants, while higher numbers are faster time constants. Because the time constants are program-dependent, calibrating these controls in absolute time values (ms/dB) would be useless—therefore we use relative numbers. Use a *higher* number if you want “faster” attack and release, and a *lower* number for "slower" attack and release. A special algorithm within the Wideband AGC Attack time circuit prevents the loss of Wideband AGC gain reduction when the Attack time control is operated at extremely slow values.

The ***Make-Up Gain*** control sets the amount of gain to be filled in during quieter, softer program passages. The range is ***OFF*** to *7*. This function is also program dependent, and it interacts somewhat with the main

Attack and Release time constants. As the attack/release times are modified, the system also scales the ***Make-Up Gain*** time constants. Use *less* makeup gain for processing more faithful to the source material; use *more* makeup gain for greater loudness and "density."

The ***Gate Thresh***old control sets the level at which gating of the AGC occurs, which "freezes" the gain during short pauses. Correct adjustment of this control helps to minimize "pumping", and the increase of background noise during pauses in programming. The control range is ***OFF*** to *7*.

There are two RTP (Return to Platform) parameters, ***RTP Speed*** and ***RTP Level,*** that determine what happens to the AGC gain when the ***Gate Thresh***old is reached and audio is gated. With the ***RTP Level*** set to *5*, *10* or *15* dB of gain reduction, the gain will return to that pre-defined level when gated. How quickly the target gain reduction level is reached, is set by the remaining ***RTP Speed*** settings (Slow, Medium or Fast). If no RTP gain reduction is desired, use the ***RTP Speed*** setting ***Freeze***. The ***Freeze*** setting means that when the audio falls below the gating threshold and the audio is gated, the gain reduction freezes at whatever gain reduction value there was at the instant the audio dropped below the gating threshold. This gain is held until the audio level again reaches and exceeds the gating threshold. Note that due to the way in which the RTP 'circuit' works, the RTP Speed settings are somewhat affected by the setting of the Attack time control.

If you wish to bypass the Wideband AGC stage, you may do so by selecting the ***Bypass*** option. When the AGC is bypassed, the static gain remains the same as if 12dB of gain reduction was in effect and the ***Master Drive*** control was set at 0.0dB.

AGC Crossover (XO)

The audio signal from the WB AGC section is divided into five user-adjustable frequency bands within the AGC XO section. The crossover frequency points for the five bands are controlled by the four controls along the bottom of the window. The various crossover choices are:

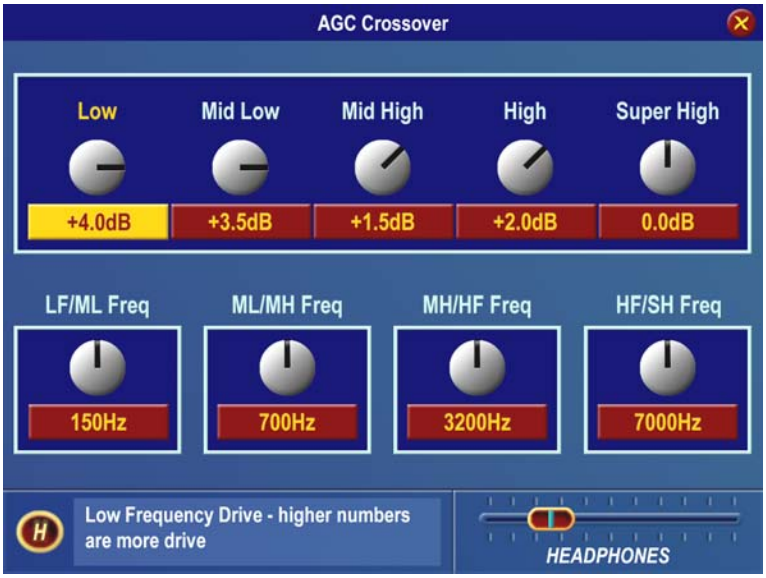
Low Freq. to Mid Low (LF/ML) – 100Hz, 120Hz, 150Hz, 190Hz, 250Hz;

Mid Low to Mid High (ML/MH) – 400Hz, 500Hz, 700Hz, 1Khz, 1.5Khz;

Mid High to High Freq. (MH/HF) – 2.5Khz, 2.8Khz, 3.2Khz, 3.7Khz, 4.4Khz;

High Freq. to Super High (HF/SH) – 5.5Khz, 6Khz, 7Khz, 8.5Khz, 10Khz.

Note: The factory default crossover points for all presets are 150Hz, 700Hz, 3.2kHz and 7kHz.



AGC Crossover Submenu

The drive level to each AGC band can be set by the controls at the top of the window. There is +/-6 dB of gain adjustment available for each band. Just as in properly setting a program equalizer, the best sound, consistent with preserving signal headroom is usually obtained by reducing the gain of the louder band(s) rather than increasing the gain of the lower level band(s).

For example: if the program source material has widely varying high frequency levels, a common action is to just turn up the output mixer controls. However, consistency can be improved much more effectively by adding a bit more drive level to the upper AGC bands, and then reducing their output levels slightly in the post AGC Mixer. This type of adjustment strategy will result in better long-term high frequency consistency, and a more pleasing air sound.

Multiband AGC Windows

Each of the multiband AGC's has its own set of controls similar to those in the Wideband AGC section. The four controls in these windows, ***Attack***, ***Release***, ***Make-Up Gain*** and ***Gate Thresh***old, and the two parameter selections, ***RTP Speed*** and ***RTP Level,*** function like those in the Wideband AGC window. Adjustment strategies are similar, however in the mutiband AGC sections adjustments are on a "per-frequency band" basis.

Low Band AGC shown as example – other bands are identical

As with any multiband processor, improper adjustment can exaggerate noise at high frequencies, particularly with older recordings that possess a good deal of tape hiss. This can especially occur if the higher AGC bands are driven so that significant gain reduction occurs, and the band's gating control is set to the lower end of the scale. During audio segments that have little or no HF content, the AGC will try to increase its gain in an effort to restore treble balance. Even during periods when the gate function is in the default ***Freeze*** mode, the problem might still exist with some programming. In those situations, even an increase of the gate threshold control to higher numbers may not help the situation.

Therefore, each band of the multiband AGC incorporates a Return To Platform (RTP) feature similar to that available within the Wideband AGC process block. When the RTP function is set to a value other than ***Freeze,*** the band gain will be forced to recover its gain to a static value higher than might be achieved if the control was set to ***Freeze***. This will reduce hiss and other high frequency noise. The RTP levels can be tailored for each individual AGC band as desired.

Use the ***RTP Speed*** to set the amount of time it will take the AGC to return to the set platform level. There are four choices: *Freeze, Slow, Med, and Fast.* The default setting is *Freeze*, which freezes the gain whenever gating occurs. Therefore, to activate the RTP for that band, just select a speed. As mentioned previously, the RTP speed is slightly affected by the value of the attack time that is set for that band. The opposite is not true: *RTP Speed* does not affect the operation of the attack/release functions. ***Freeze*** can be considered the “off “ mode for the RTP function.

Use ***RTP Level*** to set the platform level. There are three choices: -5dB, -10dB and –15dB. The default

value is –10dB. Keep in mind that the RTP function must be activated for this parameter to be relevant. Note also that for some presets, small changes we made to the compression ratios will affect the displayed value of the RTP. For instance, if you set the RTP gain value to "10" but notice that the band gain recovers to –12 when gated, it is because we have set a slightly higher ratio for that band. Note that ratios are critical to the open and musical sound of the Omnia6-fm, and therefore we do not offer them as user adjustments.

If you find that the Multiband AGC is artificially brightening some program material too much, slower release time settings for the higher bands may be appropriate. Users have reported that release time settings of "1.5" for band #4, and "1.0" for band #5 work quite well to keep this issue under control without punching holes in the high end.

AGC Mixer (Mix)

AGC Mixer Submenu

This is where all five of the multiband AGC's are mixed together. Use care in adjusting this section, as too much level from one particular band may cause an excessive amount of emphasis to that range of frequencies. Such adjustment may also drive the limiter bands in that range of frequencies too hard, causing the sound to become unnatural, dense, and squashed. As explained earlier, if your desire is to “EQ” the sound, you should perform that function using the drive levels in the ***AGC*** *or* ***Limiter XO*** *Parameter Windows.* The AGC mixer is primarily intended for minor “EQ” changes to the overall sound or for providing a complementary cut to the AGC Crossover settings to improve consistency (see AGC XO above).

Enhance

Each of the ***Deep Bass***, ***Phat Bass*** and ***Warmth*** controls can boost the level up to 12 dB. Be careful here not to overdrive the following limiter sections or over emphasize these lower frequency ranges. When used properly this specialized low frequency enhancement tools can deliver the thunderous bass and warmth that the Omnia is known for, and it can do so without making the sound muddy. It serves to greatly complement the Omnia-6fm's clear and open high end to provide a well-balanced, competitive, CD-like sound that is both powerful on the dial, as well as pleasing to the ear.

Enhance Submenu

Deep Bass EQ: For those who demand *thunderous* bass, the Omnia-6 has it! Up to 12 dB of "thunder" can be added to shake your listener's walls! This is not a simple bass boost, but a rather sophisticated concept that takes into consideration the time alignment of the low frequencies as they pass through the entire Omnia system. It allows a loud, clean low end, with absolutely no sacrifice to the overall loudness of your signal. We won't tell you where the control is in the signal chain. But we *will* tell you that ***Deep Bass*** function is a shelf boost at 85 Hz, utilizing a phase compensated 12dB/octave slope to emulate the EQ function.

Phat Bass EQ: Phat Bass is a unique enhancement that adds filtered harmonics of the lower registers to the upper bass frequencies. The algorithm extracts information contained in the initial attack to do its work, and low frequency texture is therefore emphasized. Older recordings sound fuller (or phatter) with the added illusion of loudness. ***Phat Bass EQ*** also helps radios with small speakers sound like they have more bass than they actually do.

Warmth EQ: The Warm Bass parameter in the Enhance section of the Process submenu is a shelf boost at 150 Hz. ***Warmth EQ*** compensates for program material that is naturally lacking in upper-bass punch. Be judicious about applying too much, as the resonant frequency of most automobile interiors lies in this frequency range!

Space EFX: The Omnia6-fm contains an intelligent DSP-based stereo enhancement tool that enhances the stereo soundfield without causing unnatural "hole in the middle" imaging or exaggerated multipath. Program audio previously lacking in stereo width will have noticeably increased ambiance and dimension when the *Space EFX* is active. Vocals will stay up-front and the sonic details of musical instruments are heard with an apparent slight loudness increase when listening in stereo.

The ***Space EFX*** control has a range of 0 (*off*) to 16 and the amount of dynamic width expansion can be observed on the rightmost vertical bargraph on the Meter Display screen. The system should be initially auditioned using light amounts of ***Space EFX,*** with an initial setting of 4 to 6 recommended as a starting

point. The overall stereo soundfield will appear wider and be much more consistent sounding between program sources. The smart Stereo EXP algorithm turns off when a mono program source is present. If you find that your mono programming sounds a bit thin, you can add a small amount (2 dB) of ***Phat Bass*** boost to restore warmth to the overall air sound.

Limiters Crossover (XO)

Limiters Crossover (XO)

The audio signal from the Enhance section is again split into six bands to drive the multiband limiter section. The limiter crossovers frequencies are fixed at 85, 330, 1000, 3000 and 7500 Hz. Factory drive settings are initially recommended, but the overall density can be adjusted by changing all 6 drive controls up or down an equal amount. More drive to the limiters will increase the density of the audio providing a louder but more squashed sound. Less drive will reduce the density and provide a more open, more dynamic sound. Reducing the overall limiter drive too much can rob you of loudness. Note also that the upper three limiter bands (4,5 & 6) will generally not show as much average gain reduction (little or none at times) as the lower three bands. This is normal and accounts partially for the improved clarity in the Omnia-6fm. You will notice brief, fast bursts of significant gain reduction on these bands especially on bright dynamic program material and vocal sibilants.

If you are familiar with the limiter section in the Omnia Classic, you'll remember that significant gain reduction was necessary in order to achieve extreme loudness. That is NOT the case with Omnia6-fm! The limiters are true limiters, and therefore don't need to do much work after the multiband AGC section to create a huge signal on the dial. In fact, the most common mistake that our first customers made when adjusting the Omnia6-fm was overdriving the limiters. A little goes a long way. In fact, it may help to think of them not as limiters, but as "Clipper Resource Allocators". They should only do just enough work to keep the audio in each frequency band from driving the final clippers too hard, and no more.

Multiband Limiter Windows

Limiter Submenu – SL Limiter shown as example

The controls in these adjustment windows are similar in function to the previously described AGC stages. However, there are only four controls for the limiters. The Attack and Release controls work similarly to the AGC sections, but are of course much faster on overall action. There are also two new parameters as well. The first is the ***Hold Thresh***old. This control sets the threshold where the limiter's *Hold* algorithm begins when it detects pauses in the audio. When it's in the ***OFF*** position, the limiters will attack, and then release completely, just as you would expect them to. With ***Hold Thresh***old enabled, the limiters will momentarily stop and rest during very short pauses, especially during live speech. Functionally, this is similar to how the ***Gate*** function works in the preceding AGCs. The other control is ***Limit Thresh***old**.** This control sets the threshold where audio peak limiting begins. Care is needed when adjusting this control because *raising* the threshold (counter-clockwise) causes less limiting to occur, and the resulting uncontrolled peak energy will go to the clipper instead. Thus, with this control you can artistically trade off the dynamic limiting against brick wall clipping, as each has its own "sound."

As the limiter threshold is lowered by turning the Limit Thresh clockwise, the peak output level of the limiter is reduced. The signal in that band won't hit the clipper as hard, and you'll notice more action on the limiter bargraph for that band. In fact, instead of reducing the output of one of the audio bands in the Final Mixer section, you could instead "dynamically reduce" the level in that band (which also increases density in that band) by lowering the limiter threshold.

When adjustments are made to limiter thresholds, start by making adjustments in 0.5dB steps. Reducing the threshold too much can cause the system to create an effect that "sucks out" the frequencies in that band. Conversely, the opposite (raising the threshold) will create an exaggerated effect by over-enhancing certain frequency ranges, as well as causing increased distortion, since excessive levels from that band will reach the following clipper stage. Usually, the limiter thresholds are adjusted as a "fine polish" on the final sound. If you are unsure about how to use the ***Limiter Thresh***olds, then we recommend that they be left at their well-researched factory settings. I

Final Mixer (Mix)

Limiter Mixer (final mixer)

This is the final summing point for each of the multiband limiter sections before the signal reaches the final clipper. Care should be used when adjusting this section, as too much level from any particular band could cause an excessive amount of clipping distortion to that range of frequencies. A tribute to this fact is the extremely fine, 0.10dB step resolution of the controls! Adjusting all 6 controls an equal amount is virtually the same as adjusting the ***Clipper Drive*** control in the Clippers Window. If your desire is to provide some custom "EQ" to the sound, it is better to perform that function using the drive levels in the ***AGC or Limiter X-Over*** menus instead of the limiter mixer controls. Like the limiter threshold controls, the final limiter mixer is mainly for minor "fine polish" to the overall sound. Adjustments in this section must be done with care.

Clippers (Clip)

Clipper Submenu

Bass Clip Threshold: Limiter bands 1 & 2 have their own clipper and time-aligned low-pass filter in order to reduce IM distortion in the main clipper. The ***Bass Clip Thresh***old control sets the threshold of the bass clipper referred to the clip level of the main clipper. A higher threshold (counter-clockwise) will reduce the amount of bass clipped by the bass clipper but cause a corresponding increase in the amount of bass clipped by the main clipper. Conversely, a lower threshold (clockwise) will reduce the amount of bass sent to the main clipper but increase the amount of activity in the bass clipper. Too much clipping by the bass clipper can soften bass 'punch'. It may also be heard as a "rattling" sound in the bass. Fine tuning of the bass clipper drive level is also possible by adjusting the band 1&2 controls in the ***Final Mixer*** as these feed the input of the bass clipper.

Clipper Drive: Here is where the Omnia6-fm's loudness versus quality advantage is most evident! The main clipper is a very powerful algorithm, is highly oversampled, and is fully anti-aliased. This clipper control's adjustment range is +/-6 dB, in 0.1dB steps. It is advisable to make minor changes, primarily as the 'loudness fine tuner'. Be careful; there is a lot of available power here!

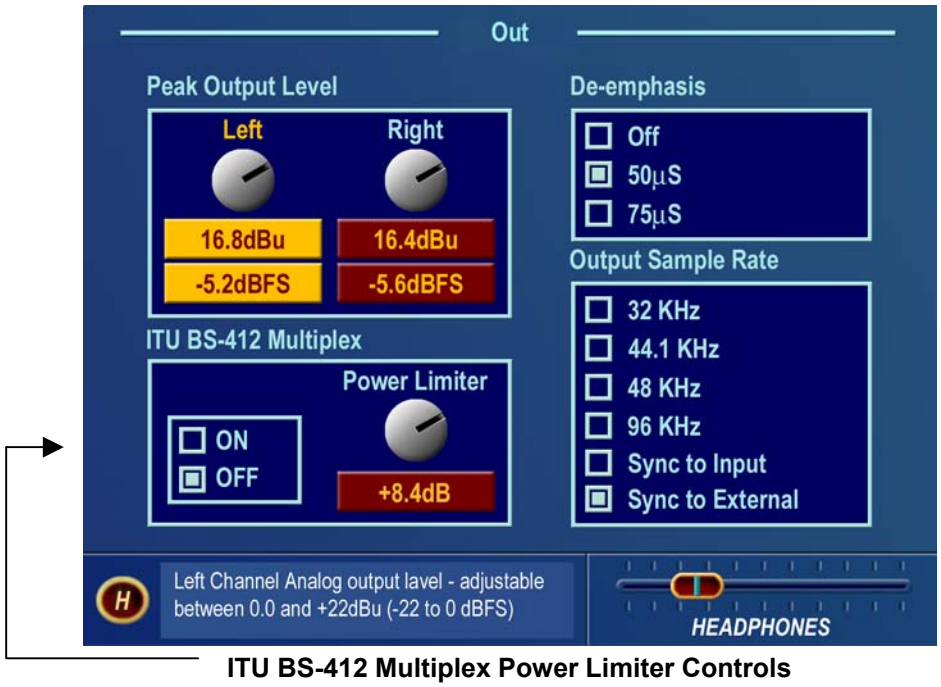
Clipper Silk: This control adjusts the texture of the main clipper when the clipper is handling significant mid and upper midrange program material such as solo electric guitar, etc. We've brought out a hidden control from the distortion-canceling algorithm to allow you to make subtle tradeoffs in how the final clipper texture sounds. Higher numbered settings (clockwise) soften (or silken) the sound of the clipping at higher frequencies, with only a slight reduction in brightness on some material. The sound of clipping low frequency material (<2Khz) is largely unaffected.

Composite Drive: This controls the drive to the DSP-based composite clipper. A setting of 0.0 is the same as the clipper being "off ". This clipper operates on the entire baseband signal up to 53kHz, except for the 19kHz pilot. No matter how hard you drive the compostie clipper, you cannot clip the stereo pilot. Embedded within the composite clipper is a 53Khz phase linear low pass filter for SCA protection, as well as a wide and deep pilot notch filter. These filters combine to remove clipping harmonics and prevent them

from affecting the stereo pilot and SCA regions.

Adjusting and Using the BS-412 Multiplex Power Limiter

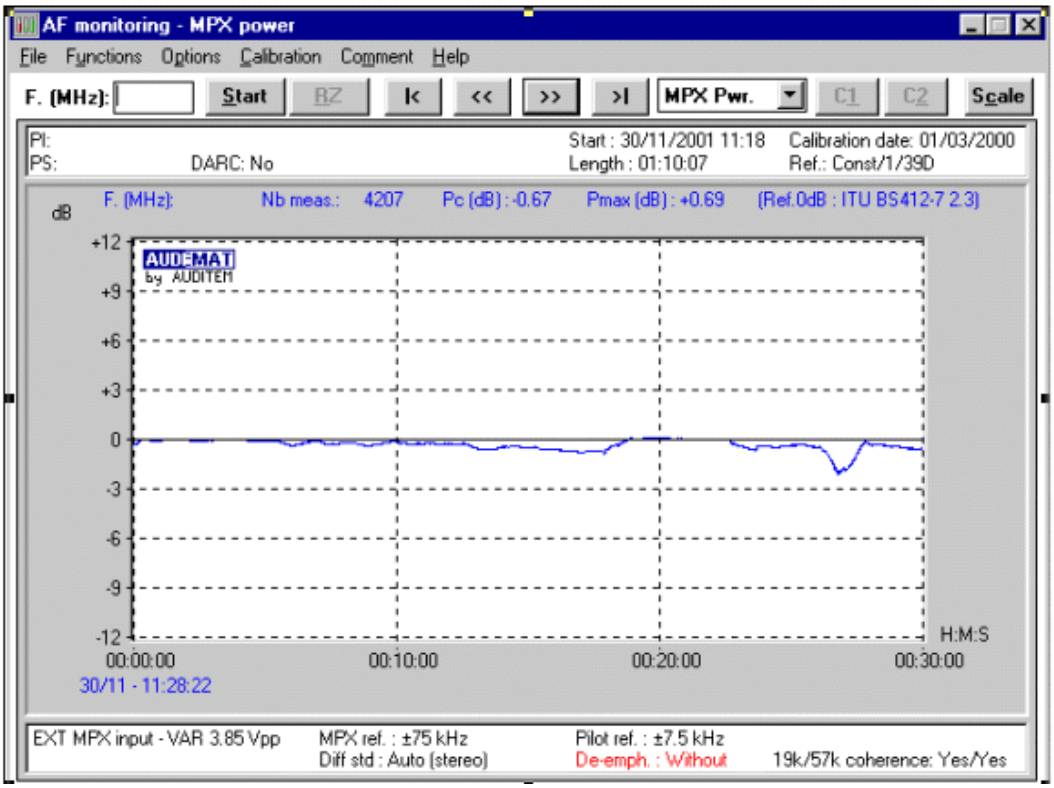
The Output Menu contains controls for the Omnia 6's proprietary ITU BS-412 Multiplex Power Limiter algorithm. This algorithm is an enhancement of a DSP based design first pioneered by Frank Foti as an enhancement for the original Omnia FM product.



ITU BS-412 Multiplex Power Limiter Controls

The concept behind the Multiplex Power Limiter is deceptively simple. It watches the average power of the processed, pre-emphasized audio in the left and right channels, and adjusts the audio density so that the peak to average ratio is controlled to the desired degree. By turning on the multiplex power limiter and setting the control to 0.0dB, compliance with the original standard is assured. Raising the control to values above 0.0dB will increase the multiplex power as allowed in certain, less-restrictive countries. The graph on the next page demonstrates the effectiveness of the power limiter algorithm.

The graph below was captured from an Audemat DFMA2 measuring instrument. It shows the analysis of a 30-minute segment of audio as processed by the Omnia 6 with the ITU BS-412 Multiplex Power limiter enabled and adjusted to the 0.0dB setting. Note that at no time during the measurement interval does the average power exceed the zero dB reference line. Segments of audio seen falling below the line were portions of talk programming and naturally occurring breaks in audio as would be seen in a normal broadcasting environment.



Setting the threshold control to values above 0.0dB, will cause a like increase in average multiplex power above the 0.0dB limit shown in the above graph.

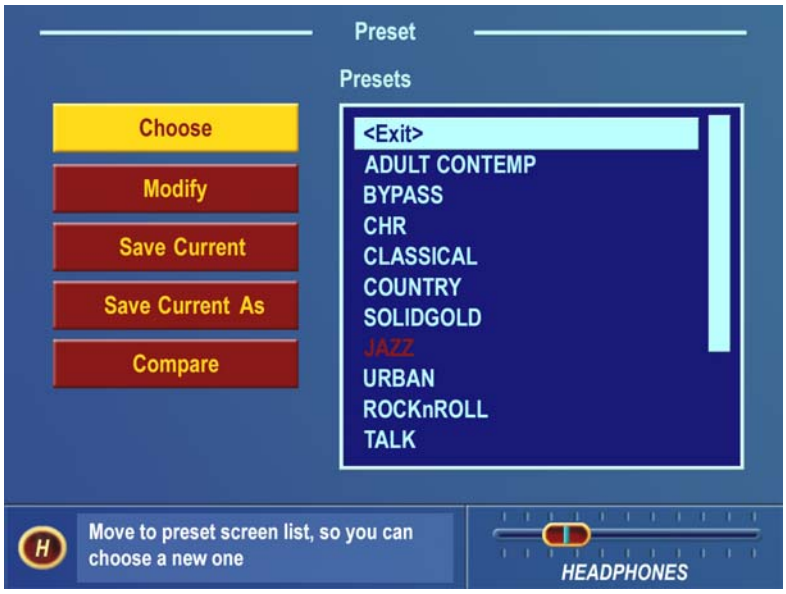
Loudness Loss Warning!

If your country's regulatory agency does not require the use of the ITU BS-412 Multiplex Power Limiter, make certain that the BS-412 Power Limiter is set to off, or severe loss of loudness will result! For example, when the ITU BS-412 Power Limiter is switched on and set at 0.0dB, there is approximately a FIVE dB loudness loss over the limiter being switched off!

Saving, Renaming and Deleting Presets

Saving Presets

Upon completing a preset editing session, the processing changes should be stored. This way they can be recalled later, or even transferred to another Omnia6-fm. Storing the settings writes them to the PC memory Card, either by overwriting an existing preset, or by creating a new preset. It is also possible to delete presets that are no longer needed, and deleting unused presets frees up memory space and makes it available for saving newer ones. The Omnia-6fm PC Card has the capacity to store up to 75 User Presets.



Preset Submenu with save options

When processing adjustments are completed, a choice should be made to either save the changes over the existing preset (if it's not a factory preset) or create a new User Preset. This is done from the ***Preset*** menu. If you want to save the changes using the current preset name, highlight ***Save Current*** and click. After prompting you to verify that you wish to save the settings over the currently selected preset, the system will save the latest changes made to the current preset name.

To save the preset under a new name, thus keeping the original preset and creating a **new** preset that will be added to the bottom of the preset list, highlight ***Save Current As*** and click. A "Save Preset As" dialog box appears on screen so the characters in the new user preset name can be entered.

The first character in the current preset name will be highlighted and flashing. To change this character, click the jog-wheel. This stops the cursor from flashing, indicating that the character may now be changed. Rotate the jog-wheel to step through the available characters. With the desired character shown, click the jog-wheel to select that character. This jumps the flashing highlight to the next character position in the name. If the next character does not need to be changed, rotate the jog-wheel and the flashing highlight will step past each character in the name. Up to 12 characters can be used in a Preset name.

After entering the preset name's last character, rotate the jog-wheel until the √ ***Checkmark*** is highlighted. Click the jog-wheel to save the new preset. If you wish to cancel the operation, highlight the ***X*** instead and click the jog-wheel. The operation is canceled and the *Preset* list and menu is again displayed.

Note: You cannot save a preset using any of the factory-supplied preset names. A different preset name *must* be used, using the ***Save As*** menu option. This prevents accidentally overwriting the factory presets.

Renaming and Deleting Presets

To rename or delete a preset, highlight and click the ***Modify*** choice in the ***Preset*** menu. Rotate the jog wheel to highlight the ***Preset List*** and click. Now highlight and Click to select the preset to be modified. To rename the selected preset, highlight and click on ***Rename***. The Rename Preset dialog will appear and a new name for it can be entered. (See Saving Presets above) After entering the preset name's last character, rotate the jog-wheel until the √ ***Checkmark*** is highlighted. Click the jog wheel to save the new preset. If you wish to cancel the operation, highlight the ***X*** and click. The operation will be canceled and the Preset Menu again displayed. To ***Delete*** the selected preset, highlight and click on ***Delete***. You will be asked to confirm the destruction of the selected preset. Highlight and click on ***Yes*** to go ahead and delete the preset or ***No*** to cancel and return to the Rename and Delete screen.

Getting the Sound You Want

If you believe that you're in a loudness war and you need to react aggressively, here are some suggestions that should help you achieve that goal. Conversely, if you have the rare luxury to strive for increased sound quality, we have suggestions for you too! Omnia-6 is designed to minimize the impact of the quality vs. loudness trade-off.

We recommend that before starting the process of *cranking it up* just for the sake of raw loudness, try to decide what sonic characteristics you feel are lacking in your station's sound. In many instances, it's not just about increasing the drive to the limiters, the clipper, or the composite clipper. It can be as simple as creating an *illusion* of added loudness by changing a single time-constant parameter. There are even known instances where the use of *stereo enhancement* created the necessary apparent loudness. Please don't bite at the first temptation to *crank* the system. Sometimes the old adage of *less is more* really applies!

Before delving into alternative processing possibilities, please give the next brief section some thought. It may help provide you with some needed direction in your overall processing plan.

A Word about Loudness

Making this confession is a little like telling your parents you dented the car. But here it goes: It's OK for your station to be loud. *Very, very loud.*

In the past, loudness was a problem due to the limitations of the processors of the day. In the quest for ultimate loudness, you probably either adjusted (or modified) your old processor well outside of its "safe" range, or used multiple boxes in the signal chain and accepted the byproducts of the interactions and conflicts among them.

Omnia-6fm has changed all of that! It's been designed to look at the incoming audio, and *know* how to make your station consistently loud on the dial, and without the artifacts or grunge created by your current

processor. Omnia-6 makes loudness an effortless exercise for *all* formats.

One more confession. It's also OK for your station to *not* sound loud, yet sound incredibly musical and grunge-free, because the Omnia-6 has given you the choice. Omnia6-fm is a system that maximizes the audio quality of your signal, yet at the same time satisfies your competitive requirements.

Quality versus Loudness

The trade-off between quality and loudness is primarily determined by how you choose to use the limiting and clipping sections. While each function alone will generate "dial presence," they each have different advantages, as well as side effects.

When excessive limiting is used, intermodulation distortion is increased, making the audio sound "mushy", and "smeared." The added short term density can also cause the audio to be "tight", "squashed", or "dense." The "dynamics" artifacts caused by excessive limiting might sound like "pumping," "breathing." The rule for limiting is "a little goes a long way!"

When excessive clipping is used, harmonic distortion is increased. The audio level is in effect "running into the brick wall." Too much clipping can cause the audio to sound "broken-up," "torn," "rough," or "edgy." As you might imagine, the harder the limiters and clippers are driven, the louder the audio perception. However, you are also much more likely to encounter increased intermodulation and/or harmonic distortion.

The following sections are provided to assist you in designing the personality of your station's sound. As we said earlier, there is no precise recipe for setting up audio processing. While there are some basic fundamentals that you can use to get started toward the sound that you desire, it may require a concerted effort with extended listening and subtle processing changes over time to achieve your ultimate goal. Just remember to know your competition, know your goals, take your time, and adjust methodically.

Increasing Loudness

Try to resist the temptation to just *crank up* the aggressive processing sections, like the limiters. Those will add loudness of course, but usually at the cost of quality. Many times, building a little more RMS level in the AGC sections will do the trick instead, and with no obvious sonic penalties. The following are some suggestions on where to begin to make changes. We suggest that you them in the order described.

Increasing loudness can be accomplished in four ways:

1. Alter the following parameters in the AGC sections:

   • Increase the ***AGC Drive*** to the **WB** (wideband) AGC section.

   • Increase the ***Drive*** to each band of the Multband AGC in the AGC **XO** (crossover) screen ***or*** reduce (set to lower numbers) the ***attack time*** of the **WB** AGC section, causing an increase in activity in the Multiband AGC sections.

   • Increase the ***Release*** time settings in each band to make it operate faster.

   • Increase the amount of ***Make-Up Gain*** in each band.

2. Modify the Multiband Limiter sections:

- Increase the ***Drive*** to each section using the controls in the Limiter XO screen.
- Increase the ***Release*** time settings in each band so that they operate faster.
- Set the ***Hold*** threshold to a lower value.

3. Drive the Clipper sections harder.
4. A combination of the above steps, but in small increments! It might sound crazy, but it's true! In this situation, resist the temptation to make too many changes at once. When that occurs, it becomes difficult to determine why the result of an adjustment did or did not make sense. Focus on one specific area of your sound at a time. Once that area is satisfactory, then move the focus to the next area, as needed.

Based upon the above suggestions, you can experiment with different styles of processing. Some broadcasters prefer to have their processing be perceptibly loud, but dynamic. This may not result in the loudest station on the dial, but it still gives the illusion of loudness, retaining detail and clarity, and reducing listener fatigue. This can be done by centering your efforts in the Limiter sections, and avoiding heavy use of the clipper. One trick that works well is to use very fast attack and release times in the multiband limiters, but do not let them produce more than 5 dB - 7 dB of gain reduction. This keeps the IM distortion of the limiters to a minimum, and doesn't "over-squash" your sound. Adjusted in this manner, the Limiter sections are relied upon to generate higher long-term RMS levels, which translates into increases in perceived loudness.

If the quest is to produce the "loud and proud" appearance of the "big boys" in town, then the limiters and clippers should both be leaned upon a bit more. *Loudness at all costs* is usually the reason for moving the processing in a direction like this. Using larger amounts of drive to the multiband limiters, along with faster release times will generate a signal of high short-term density. Also, an increase in clipping will further aid this. The effect of the processing set in this manner is that the audio is consistently loud at all times . . . a wall of sound. The drawback is that the *density* can cause listener fatigue and have a negative effect on time spent listening. While Omnia-6 is designed to minimize listener fatigue, it is capable of generating large amounts of density that could eventually lead to fatigue. Be careful!

Adding More Detail — When Loudness Isn't the Last Word

Now that we've "squashed the grape," lets look at what it takes to undo a heavily processed signal. Basically, just reversing the procedures listed above will do the trick:

1. Reduce the drive to the Clipper.
2. Back off on the influence of the Limiter stages:
   - Reduce the amount of ***Drive*** to each band in the Limiter XO screen.
   - Reduce the ***Release*** times to slow down recovery.
   - Raise the threshold of the ***Hold*** function.
3. Ease up on the Wideband-AGC sections:
   - Reduce the ***Drive*** to the WB AGC and the Multiband AGC bands in the WB and AGC XO screens.

- Reduce the ***Release*** time to operate slower.
- Reduce the amount of ***Make-Up Gain***.

Backing off the clipping sections first will allow the processing to retain a level of competitive loudness while enhancing quality, and the overall dynamic texture will be affected less. Start with reducing the ***Clipper*** amount in 0.5 dB steps. It's surprising how much detail can be restored from just a small change of 0.5 dB. Generally, changes in the ***Clipper*** drives will have the most noticeable effect on quality, but it will also affect the relative loudness level, too. You'll need to find a "happy medium" that's right for you.

Making Air-Sound Equalization Changes

Tailoring the shape of the overall audio spectrum can be done in three different sections:

1. The relative ***drive*** settings in the multiband AGC ***XO*** menu. These controls set the drive levels of the multiband AGC sections.
2. The relative ***drive*** settings in the multiband Limiter ***XO*** menu. These controls set the drive levels of the multiband limiters.
3. The settings of the multiband limiter ***Mix***er controls.

All three options will provide noticeable change in EQ. We suggest you use the first two listed options. In either case, an EQ change is still followed by a *dynamically* controlled stage. Therefore any excessive EQ change can be 'undone' by the subsequent AGC or Limiter.

The last option, adjusting the Limiter *Mixer*, is designed to provide a final *minor* trim to the spectrum. If you've noticed that we calibrated these controls in 0.10 dB steps, then you know what we mean when we say these controls are for fine trim! Since this stage is *after* all of the dynamic AGC and Limiting, a radical change in level in the *Mixer* will result in additional and possibly excessive clipping of audio in that band. We suggest that changes implemented here be limited to no more than about 1.0 dB. Naturally, the decrease in mix level can be done to any desired amount.

Thunder Bass

Omnia-6 has the power to shake the walls with low end! If your source material has it, Omnia-6 will put it on the air, and with muscle! Making changes to this characteristic is done using the following parameters, and for maximum effectiveness, in the order listed:

1. In the Enhance Menu, increase the amount of ***Deep Bass or Phat Bass*** boost.
2. Increase the drive to the LF Limiters with the appropriate controls in the Limiter ***XO*** screen.
3. Speed up the ***Release*** times of the LF ***Limiter*** sections.

When it comes to processing, moderation is the key! If all of the above steps are utilized in the pursuit of more bass, then severe low frequency over-enhancement can occur. Excessive bass boost can produce the illusion that the presence and high frequencies have been lost. They are still there, but are being acoustically masked by the lower frequencies.

Another concern is the creation of bass-induced intermodulation distortion in the clipper. This artifact

might be noticed on midrange/presence frequencies whenever a sustained bass note is present. An example of this would be a strong bass signal “underneath” a sustained vocal passage. The vocal passage will begin to sound as if it “warbles” a little bit. This is a sign that the over-processed bass energy is pushing the vocal frequencies in and out of the clipper unnecessarily.

Generally, an increase in the Enhance Menu's ***Bass*** boost functions alone will provide more than sufficient enhancement to the low end.

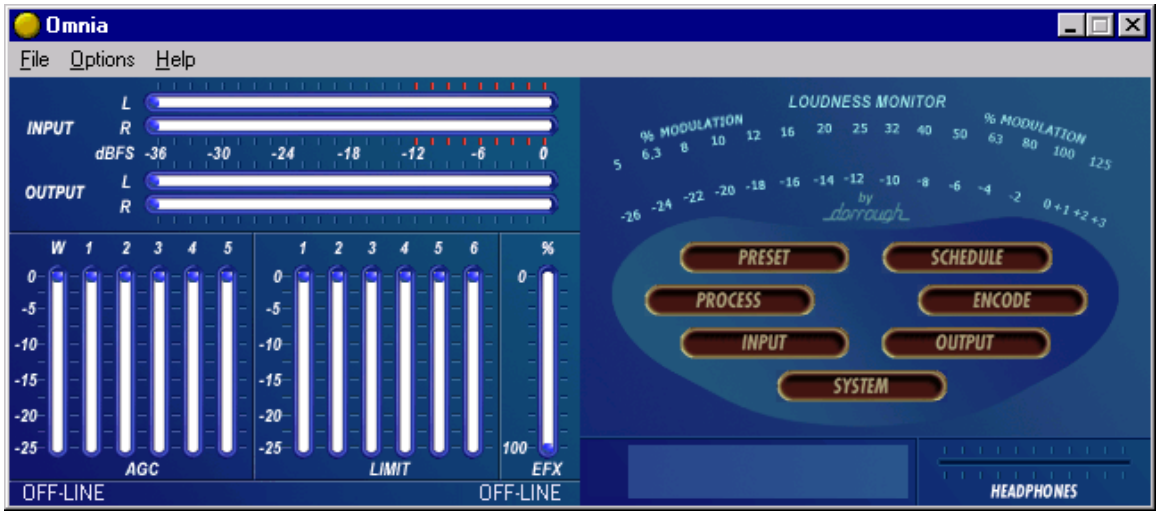
This page intentionally left blank to maintain pagination

Chapter 6

Remote Control Software

The Omnia Remote Control software is a Windows (Windows 95, NT 4.0, or higher) software program that allows remote access to the Omnia-6fm processor adjustment using any PC running the aformentioned versions of Microsoft Windows©. Note that remote software for the Omnia6-fm is unique to that product, and versions of Omnia Remote Control for our other audio processors will not work with Omnia6-fm. The latest version of Omnia6-fm Remote Control Software is always available free of charge by pointing your web browser to the "Support" page of our web site: **www.omniaaudio.com.**

The Omnia 6 Remote Control application looks very similar to the actual front panel of the Omnia 6. Before it connects to the Omnia, the words "OFF LINE" will be displayed where the Preset Name and System Time will be displayed once the remote connection is made. All metering activity also be at idle.



Omnia 6 Remote Control as it appears on your computer screen

Software Installation Options

There are two different options for installing Omnia6-fm Remote Control. Neither makes permanent changes to your computer system or to your Windows registry, so you may freely choose the one with which you are most comfortable. The first (recommended) is to use the self-installer version, Omnia6.exe. The other is simply putting a copy of Omnia6_remote1.exe into the folder name of your choosing, and running it from that location.

Using the Self Installer

If you elect to use the self-installer program (Omnia6.exe), by default it will place the executable file "Omnia6_remote1.exe" into the folder "C:\program files\Telos_omnia\omnia6", and place a shortcut to the program on your desktop.

Using standard Windows procedures, run the **Omnia6.exe** program. The install program installs

Omnia6_remote1.exe onto the computer's hard disk and places the program name *Omnia Remote Control* in the Start Menu. The default location for the copied files is "C:\program files\Telos_omnia\omnia6".

When the program is freshly installed but has not yet been run, "**Omnia6_remote1.exe"** is the only file in the specified folder. However, the first time that the program is run, it will create a small new file called "connect.dat", which contains your connection type information. When you first run the Omnia 6 Remote Control program, there is no "connect.dat" file yet, so you will receive the error message "No connection database. Creating new database". This is normal and is no cause for concern.

Using the raw Executable

Using standard Windows procedures, create a new folder by the name you wish to use, and place a copy of "Omnia6_remote1.exe" in that folder. You can then also create a desktop shortcut to that executable if desired.

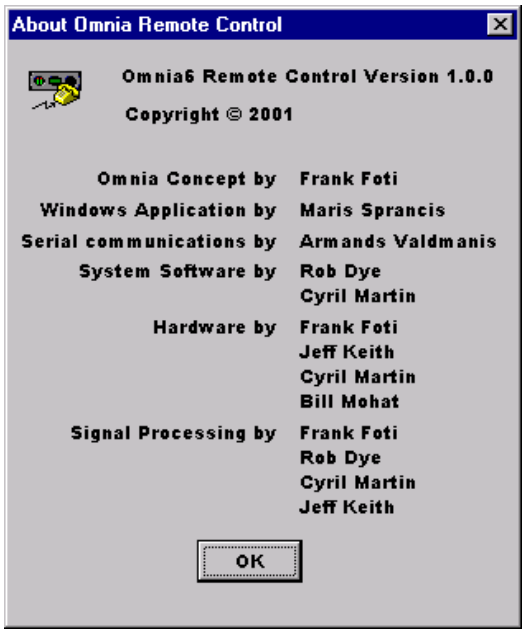
Note: When you install Omnia Remote Control software updates, you should move the old version and its associated connect.dat file to a new folder. This way, conflicts with different versions of the ***connect.dat*** database will be avoided. If you wish, the old version's folder can be safely deleted once the update is complete. You will also want to use unique folder names for each copy of other Omnia remote control programs if you have those installed. Please note that the remote control programs themselves, as well as their associated ***connect.dat*** files are unique for each version of the Omnia Classic, Omnia 3, Omnia4.5, Omnia 6fm, and Omnia Toolvox.

Setting Up and Configuring Omnia Remote Control

The Remote Control Program for the Omnia-6fm is specific to the Omnia-6fm. As stated earlier, Omnia Remote Control programs designed for our other Omnia family of products will not work with Omnia 6. The latest versions of all Omnia remote control programs are always available free of charge through the "Support" page of our web site: www.omniaaudio.com

Checking the Version Number of your Omnia 6 Remote Control Program

You can check the version of your Omnia Remote control program by clicking on the "About" option under the "Help" menu option.

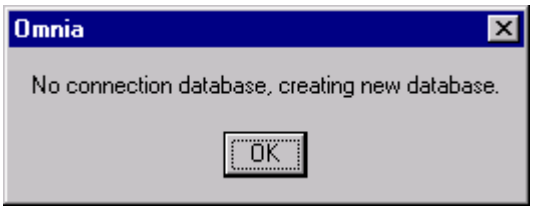


The Omnia 6 remote Control Version number is shown here.

The Omnia 6 Remote Control "About" Screen

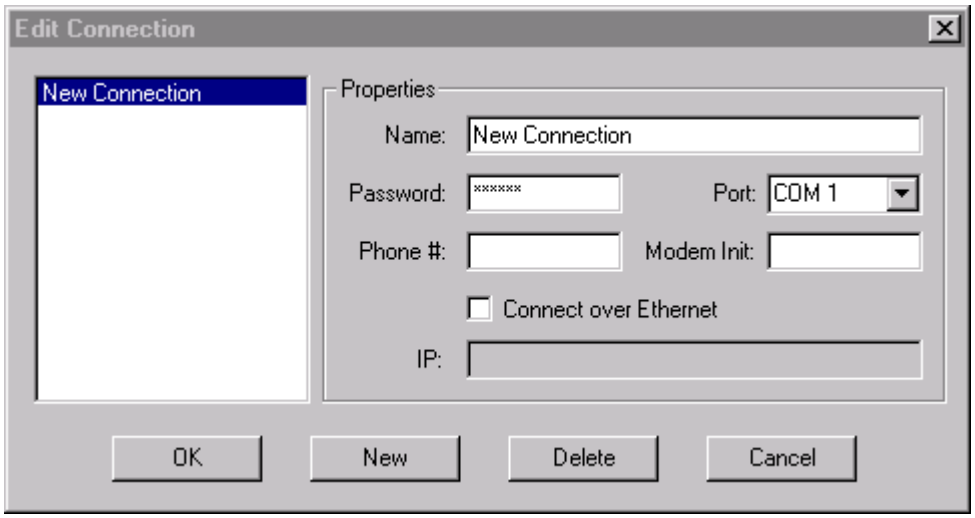
While you are configuring the data for the various connection types, the Omnia Remote Control software can be run without having to connect it to the Omnia-6fm.

Start the Omnia6_remote1.exe program. As mentioned earlier, when the program is run for the first time, you will get an error message saying: “No connection database, creating new database.” This is normal.



This message is normal the first time the program is started!

Under the Options Menu, select "Edit Connection". A new window will open, and a default “New Connection” option will be displayed. Enter required information into each of the configuration boxes.



Edit Connection Menu in Omnia 6 Remote Control

In the left side of the "Edit Connection" window will be the list of any connections that are currently contained in the 'connect.dat' configuration file. The specific names in the list are derived from the information that was entered into the "Name:" box when each connection was first set up. In the Properties Window of the dialog box, it's a good idea to edit the connection name to match the type of connection you wish to configure. The three available connection types are:

- via Direct Serial
- via Modem
- via TCP/IP Ethernet

Connection names such as “Serial” if using the RS-232 port, “Network” if using the Ethernet port or “Dialup” if using a modem may be used. This naming convention is not mandatory, but it will help keep things tidy if you decide to use Omnia 6 Remote Control to connect to several Omnia6-fm units.

(Note: Use **New** to create any additional connection entries. Use **Delete** to remove any unused entries. Select any entry in the connection list to edit its fields. Use **Cancel** to exit without making changes.)

To set up a connection:

1. Enter the name of the connection in the "Name" box. It is helpful to name the connections you create according to the Omnia they connect to, or even by the method of connection. For instance, the name box could contain entries like "WXXX Omnia", "WYYY Omnia", "WXXX Omnia by Modem", WYYY Omnia by Network", etc.

2. In the Password box, enter the login password for the Omnia that you wish to make a connection to. Remember that the factory default password for Omnia Remote Control is 'tomtom' (all lower case).

3. If you wish to connect over a network, you must check the box "Connect over Ethernet". When

you do this, the parameters required for direct serial or dial-in via modem will be grayed out. Then, only the TCP/IP address of the Omnia that you wish to connect to must be entered. Note: If you are connecting via Direct Serial or Modem, you should not check the "Connect over Ethernet" box!

4. If connecting via Direct Serial or Modem, then select the COM port that you wish to use on your PC. This COM port should be configured in Windows for the highest baud rate that your PC will support, but in any case, should be set to at least 57,600 bps.

5. If connecting via Direct Serial, no other information is required.

6. If connecting via Modem, in the "Phone #" box, enter the telephone number of the modem that is connected to the Omnia at the remote site. Any characters present in the "Phone #" box signal the Omnia Remote program to attempt a connection via modem!

If you need to use a Modem Initialization string, you may enter it into the "Modem Init" string box. If you require a modem initialization string and feel more comfortable building the entire connect string within the "Phone #" box you may do this. See "Using Custom Modem Initialization Strings" for more information.

Omnia Remote Control supports a wide variety of Hayes command set compatible modems. If you have difficulty using your modem, you may call Omnia Customer Focus for assistance, but please gather as much information about your modem as possible before doing so.

On the Omnia Side...

Remote Control Using the Supplied PCMCIA Modem

Omnia6-fm comes complete with a PCMCIA type modem card, and you must have the modem installed in order to use Omnia remote control over a dial-up connection. Before use, ensure that the Omnia-approved PCMCIA modem card is fully inserted into the lower PC Card slot on the back of the Omnia. Press on the modem card's “XJACK” connector to extend the modular telephone jack. Using a standard RJ-11cable, connect your telephone line to the Omnia modem. Make a note of the telephone number corresponding to this line, as you will need it later when you configure the Omnia Remote Control program.

Note: The modem card can be safely installed and removed when the Omnia's power is *off*. Only the PCMCIA modem card supplied with the Omnia-6fm has been tested and approved by Telos Omnia. We cannot ensure correct operation of any other modem card with the Omnia6-fm, nor can we provide support for such non-approved cards.

Remote Control Using a External Hayes Compatible Modem

The Omnia supports nearly every Hayes command set compatible modem available. Please note that in order to support the widest possible variety of externally connected serial devices the Omnia6-fm's RS-232 port does not support hardware or software handshaking. This is of no concern, and we are aware of no instances where this has prevented an externally connected modem from operating properly. The externally connected modem will need to auto-detect one of the Omnia's three rear panel serial port's baud rates (9,600, 19200, and 57,600). Because the Omnia and the modem are both DCE devices, you will need to use a crossover (null modem) cable between them.

Remote Control Using a Direct Serial Connection

In the Edit Connection window, create a New Connection and name it. Then fill in the Password box (the default password is 'tomtom'-lower case only!). The password may be changed at any time using the File Menu "Change Password" option. Note that you must be connected to the Omnia in order to change the password, and that the password change becomes valid the next time you attempt to log in with Omnia Remote control.

Select the COM port that your computer will use under the drop down list box labeled "Port". If the Omnia and computer are connected by a straight through serial cable, you should be able to connect and control the Omnia6-fm locally using the remote control program.

The Omnia is designed a DCE device, and has a DB-25 female RS-232 port connector. Your computer will typically be a DTE device, and will usually have either a DB-9 or DB-25 male connector. Since only connections between the same type of equipment require a null modem cable (DCE to DCE, or DTE to DTE), the Omnia to PC cable should be a straight-through type! A null modem cable will not work!

Connecting via Modem

Configure a new connection, also entering the telephone number to which the Omnia-6fm's Modem Card is connected. If your computer needs to dial an access code (such as "9") to get an outside line, that must be entered as well. Sometimes if the outgoing connection passes through a PBX, it might require a short pause between the outside line access code and the telephone number you're dialing. In this case, the telephone number will need to have a comma inserted into it after the '9'. (In the standard Hayes command set, a comma is a "pause" character).

Example: suppose you need to connect to a remotely located Omnia and it is connected to telephone number 555-1234 in Area code 717. To make things more interesting, your local PBX system requires you to dial a "9" to get an outside line. In this case, you'll need to dial "9" to get an outside line, as well as a "1" because it is a long distance call. In this situation, the correct entry for the "Phone #" box would be:

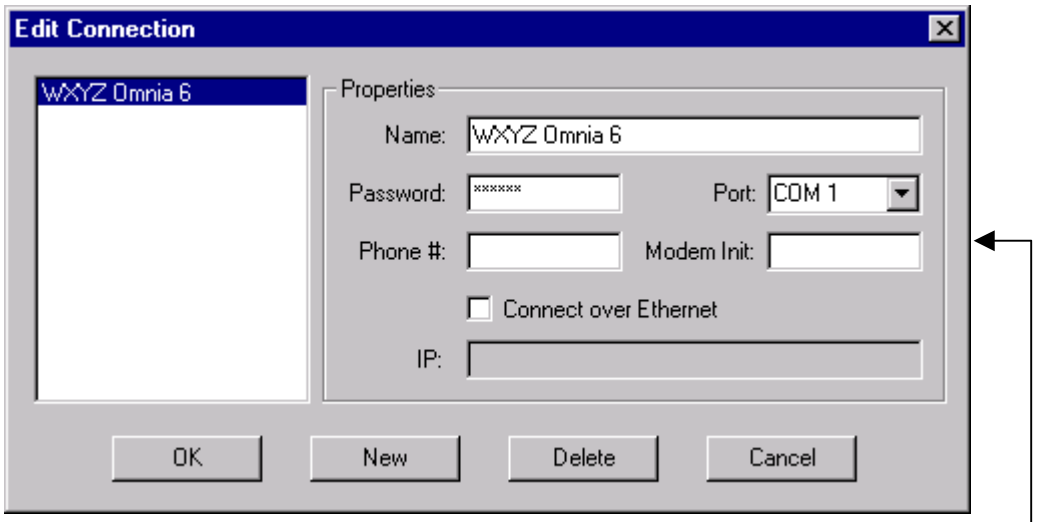
9,17175551234

To enhance 'human readability', you could parse the telephone number entry with hyphens. Doing this has no effect on the ability of the program to dial out. The entry in the Phone # box entry would then be:

9,1-717-555-1234

Using a Custom Modem Initialization String

A custom Modem Initialization String is sometimes required in order to control the behavior of the modem in special circumstances. While there are many different initialization string possibilities, the most common one modifies how the modem handles dial tone. Sometimes the modem may be connected to a circuit that does not provide the US standard 350/440 Hz dial tone, and in this case, you need to tell the modem to ignore it.



Edit Connection dialog box with "Modem Initialization String" edit box

The extra dialing commands that modify modem behavior should be entered into the "Modem Init:" box in the Edit Connections menu. If you are "modem init string savvy", you could ignore the "Modem Init:" box altogether and place the complete dialing command string into the Phone # box. The choice is yours.

As pointed out earlier, a common customer need is the ability to tell the modem to ignore a non-standard dial tone. For that situation, the most commonly used options are:

X0 - Disables both busy and dial tone detection.

X1 - Disable busy and dial tone detection.

X2 - Disable busy detection, enable dial tone detection.

X3 - Enable busy detection, disable dial tone detection.

X4 - Busy and dial tone detection enabled.

Given this information, a possible initialization string example configured to ignore the dial tone before dialing, could be:

ATX0w,xyyyzzzz or ATX0w-,x-yyy-zzz

Where "**AT**" is the start of the standard modem command string, and;

Where "**X0**" tells the modem to ignore busy and dial tone detection, and.

Where "**x**" is the number to dial to reach an outside line (if required), and;

Where "**,**" is a pause, and;

Where "**yyy**" is the dialing prefix, and;

Where "**zzzz**" is the dialing suffix.

There are many resources on the World Wide Web pertaining to the possible Hayes command set initialization string options. You can locate such resources by using the search text "Hayes Command Set" in your Internet browser. Two such sites with resources that have been helpful are:

http://www.modemhelp.net/basicatcommand.shtml
http://www.modemexpress.com/

Using a Direct RS-232 Connection for Local Communications

When a computer can be located near the Omnia-6fm, it may be convenient to use a direct serial cable connection rather than dial up. Use a standard, straight-through serial cable - null-modem cables will not work! A typical serial cable will need a DB-25 male connector for the Omnia-6fm end, and probably a DB-9 female connector on the computer end. You should verify the exact type required by your computer.

Using an Ethernet Network Based Connection

For Network connections, check the **Connect over Ethernet** box and enter the IP address of the Omnia-6fm in the box provided. The TCP/IP address entry format is: xxx.xxx.xxx.xxx. The default TCP/IP address of the Omnia6 is 192.168.0.191.

Technical note: the Omnia 6 Remote Control communicates with the Omnia 6 using a Telnet session on Port 1254. If you are unable to communicate with the Omnia through a network firewall, the first thing to check is whether traffic on port 1254 is being permitted.

Enter the password for the unit in the Password box. If nothing is entered, you will be asked for the password at the time you connect to the remote Omnia.

The default password for all remote control connections is “tomtom” (all lower case). The password may be changed at any time using the Omnia Remote Control's "File/Change Password" option. Note that you MUST be connected to the Omnia in order to change this password. Note also that the password change becomes valid the NEXT time you attempt to log in with Omnia remote control.

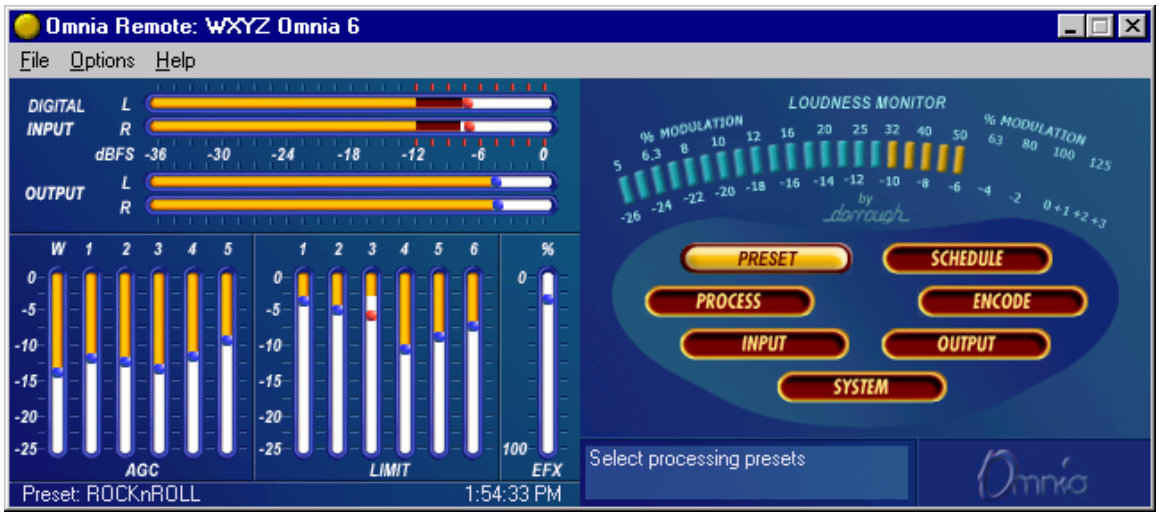
The Remote Control software allows multiple connection profiles to be created so that a mix of connection types (Direct, Serial, TCP/IP) may be used. This allows the program to easily support communicating with different Omnias at different locations, connected by different means.

When all items have been entered, select OK.

Note: These connection settings are stored in a small binary file named ***connect.dat*** located in the same folder as the remote program.

Establishing a Remote Connection

To establish a connection with the remotely located Omnia-6fm, return to the Options Menu and select Connect, which brings up a list of connections you have defined. Double-click on the name of the desired connection, or highlight it to select it and press OK. The connection will be established after a short pause, and you should see the bargraph meters become active when a connection has been established.



Omnia 6 Remote Control after connection is made. Note that the currently selected Preset and the Omnia's actual System time are being displayed.

Use Cancel to leave the dialog box without making any connection.

You can choose to have the program automatically establish a connection by going to the Options Menu, selecting Auto-Connect to Last. Then the program will always connect to the Omnia-6fm using the last-used startup connection entry.

Note that if you have not entered a Password while editing the connection type, you will be prompted for it each time you connect to the Omnia!

Terminating a Connection

From the Options Menu, select Disconnect. Closing the program will also terminate any connections.

Operation

The Remote Control Program for Omnia-6fm looks very similar to the actual Front Panel and works similarly with some added enhancements:

- Multiple control windows may be open at the same time.
- The scroll wheel on mice so equipped is supported for fast, easy adjustment of parameters.
- The ability to save, load, and print presets and system parameters to the computer. (in the File Menu) This is very handy for reference and backup purposes.
- The ability to edit and load Trigger Scripts as described below:

Using a Terminal Program and Direct Connection

It is sometimes useful to use a Direct Serial Connection and a terminal program such as Windows HyperTerminal to gain access to the Omnia's command line interface. While operating the Omnia in this manner is certainly not for beginners, the information that can be captured from the rear-panel RS-232 port, especially during system boot-up, can be very useful for troubleshooting purposes. Upon occasion, Omnia Customer Focus personnel may ask you to capture such data from the rear port if it seems necessary.

The serial communications parameters of the terminal program should be set to:

8 Data Bits
No Data Parity (None)
1 Stop Bit
Flow Control (None)

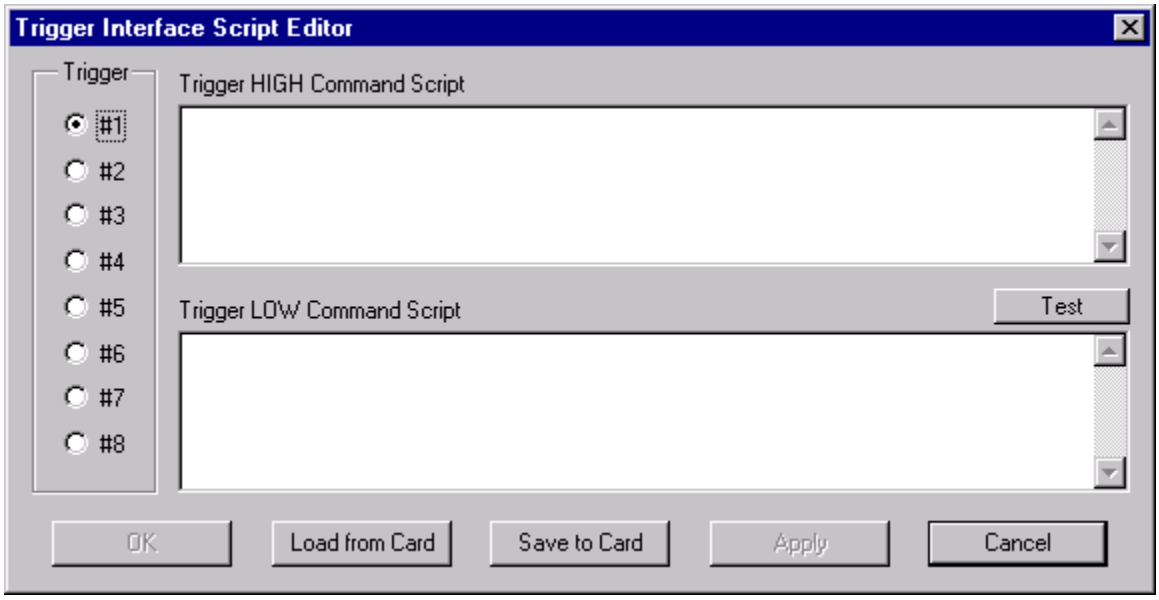
The Baud rate (bits per second) must be set to match the setting in the Omnia-6fm's System Menu. Make sure however that the maximum allowed baud rate (set in the Windows Device Manager) of the serial port being used is set *at least* as high as the desired baud rate. Setting this to the highest available setting is fine.

Once these parameters have been set, one can now log onto the Omnia-6fm with the password "tomtom" (all lower case).

Trigger Interface and Script Editor

Overview of the Trigger Script Editor

The Omnia 6 Remote Control software contains a special script editor that allows the programming of complicated system parameter changes which can be "triggered" by logic state changes on the rear-panel



"Interface" connector.

"Edit Trigger Scripts" dialog box as opened under "Options", "Edit Trigger Scripts"

Using Trigger Scripts, you can make the Omnia 6 do things with contact closures that would normally need to be done either by manual intervention at the front panel, or via Omnia 6 remote control. There are EIGHT Trigger Inputs available, and they respond to voltage levels on the rear-panel "Interface" connector.

Trigger Control by Dry Contact Closures

The simplest way to manipulate a Trigger Input is through simple contact closures to ground. Connecting a Trigger Input to ground initiates the programmed function associated with the "Trigger LOW" command, and moving the connector pin from a grounded to a floating condition issues the "Trigger HIGH" command.

Trigger Control by Applied Voltages

The Trigger Inputs are also capable of operating with a DC voltage applied, as long as such voltage does not exceed 25 volts DC. Applied voltages that are more than +1.25 volts DC on the trigger input result in a Trigger HIGH state, while voltages less than +1.25 volts result in a Trigger LOW state. Therefore, if +12 volts DC is applied, a logic "1", or Trigger HIGH is sensed. If –12 volts DC is applied, a logic "0", or

Trigger LOW is sensed. When nothing is connected to the Trigger Inputs, the inputs normally sit at approximately 3.5 volts, which is a logic HIGH.

What Can Trigger Scripts Control?

Virtually any aspect of the Omnia 6 operation can be controlled using the Trigger Script function. Therefore, we'll explain some of the different types of operations that can be performed, and the different types of commands that are required to perform each one.

Some Common Usage of Trigger Scripts

- Switch from Stereo to L+R Mono
- Switch from L+R Mono to Stereo
- Switch the Stereo Pilot off
- Switch the Stereo Pilot back on and at 9% injection
- Switch the Omnia's audio input source from Analog to Digital
- Switch the Omnia's audio input from Digital to Analog

The Para, The Syspara, and Command Line Entries

What Is A "Para"?

In general*, a 'para' is a variable that corresponds to one of the adjustable controls available within a Processing Block. For instance, the Wide Band AGC Release Time is a 'para', in fact, it happens to be 'para' 665.

What Is A "Syspara"?

In general*, a 'syspara' is a system parameter assigned to the basic operation of the "System". Controls such as the one for audio source selection, the mono operating mode, and the stereo pilot state and its injection level, each have a "syspara" value associated with it. A complete list of Omnia 6 'syspara' values can be found in the Appendix.

* In the above explanation, we used the disclaimer "in general" because there are certain exceptions.

What About Command Line Entries?

Just as 'paras' and 'sysparas' can manipulate the processing controls and system adjustments, there are higher level commands available which do even more special things. Later, we'll discuss how the command line can be used to manipulate the Daypart Scheduler.

Using The Trigger Script Editor

A Trigger Script is "written" using the Trigger Interface Script Editor which is contained within the Omnia Remote Control software. The Script Editor runs in a separate window from the Remote Control window. The Editor window is opened under the Options menu (Edit Trigger Scripts). To open the Script Editor window, the computer running the Remote Software must be connected to and communicating with the Omnia-6fm.

Starting the Script Editor (Options / Edit Trigger Scripts) opens up the Script Editor window. The eight radio buttons along the left side select which trigger script number to display and edit. The top edit box shows the script for the Trigger HIGH Command Script (contact open) for the selected input. The bottom edit box shows the script for the Trigger LOW Command Script (contact closure) for that input.

Once a script has been entered, clicking the Test button checks the script syntax, and if correct, sends the displayed script to the Omnia-6fm for immediate execution. Use the command line window and/or any alert dialogs that pop up to view the success or failure of the script. Note that executing the script in this manner does not result in the script being downloaded or saved as a trigger script, it is simply run once to see if the script, as written, actually works.

The buttons along the bottom of the window load, save, or download the current scripts being edited to the PC Card. Click “Save to Card” to permanently store the current scripts on the PC Card in one file. Click “Load from Card” to retrieve previously saved scripts. To download the scripts for use in the processor without saving to the PC Card, click “Apply” if further script editing will be done. Click “OK” to download

the current scripts and close the Script Editor window. Click “Cancel” to close the window, discarding any changes made since the last “Apply” or “Save to Card.”

Note: If you have created Trigger Scripts and clicked "Apply" but not "Save to Card", the Omnia will only remember your scripts until you power it off.

Once the scripts are downloaded into the processor, they are executed when the appropriate logic transition occurs on their assigned trigger input. Neither the Remote Control application nor the Script Editor need to be connected for the trigger scripts to execute.

Note: When a trigger script is actually executed, any problems that may be encountered in the execution of it will not be noted to the user.

Script Command Definitions

The scripting commands available for use with the Daypart Scheduler are listed in bold lettering (e.g., **parts**). Their definitions **(**e.g., Displays the current daypart table) and usage examples are also listed. The commands have been divided by general functions (Dayparts, Presets, System parameters, etc.). In use, a command is typed in and then the enter or return key is pressed. If the command is executable (e.g., **parts**), then the command is run (e.g., a table of the dayparts is displayed), otherwise the cursor simply moves to the next entry line.

Dayparts

parts	Displays the current daypart table
partadd <day> <time>	Adds a daypart to the daypart table.

The "day" parameter can be assigned the following days: Sun, Mon, Tue, Wed, Thu, Fri, Sat, M-F, S-S, All. The "time" parameter must be defined using the following format: <hour>:<min>:<sec><am | pm> . As an example, typing **Partadd Mon 5:00:00am <enter>** commands the Omnia-6 to add a daypart on Monday at 5:00:00am.

partremove	Removes a daypart from the current daypart list.

Example: **partremove Mon 5:00:00am <enter>**

partload	Loads a daypart from the PC Card.
partsave	Saves the current daypart to the PC Card.

Presets

Note: After a preset is saved to the system, the Omnia knows them by their Index Number, not by their Preset Name. Therefore, when selecting a preset, you use its index number. When saving presets, you use its name!

presets	Lists all the currently available factory and user presets by index #.
preset <preset index #>	Selects the preset by index # from the list of available presets
Example: **preset 21 <enter>**	commands the Omnia-6 to load preset number 21 in the index list.
delete <preset index #>	Deletes a preset from the preset index list by its index number.
Example: **delete 21 <enter>**	commands the Omnia-6 to remove preset number 21 from the index list.
rename <preset index #><name>	Renames the preset by its index number.

Example: **rename 21 BOOGY <enter>**	commands the Omnia-6 to rename preset number 2.
save	Saves the preset under its current name. Note: Factory presets are permanent and cannot be written over. You must use the '**saveas**' command when saving changes made to a factory preset in order to save it as a unique name.
saveas	Saves the preset under a different name.
Example: **saveas BOOGY <enter>**	Commands the Omnia to save the current settings as preset BOOGY.

Non-System Parameters (paras)

paras	Lists the modifiable parameters available for the current preset in a table format.
Example: **paras <enter>**	displays the parameters for the current preset:
paravalues <index #>	Lists all possible values for the parameter at the given index number.
para <para index #> <paravalue>	Sets a new value for the selected parameter.

Omnia-6fm System Parameters

A 'syspara' is an Omnia 6 System parameter. The System Parameters are assigned to controls which givern overall operation, such as Input and Output Gains, Pre-emphasis/De-emphasis, etc. These parameters would NOT be saved with individual presets, but instead are saved using the Save To Card command on Omnia 6 Remote control, or through the Save to Card option in the front panel's System menu.

To obtain a list of all System parameters, you use the command '**sysparas'**, which lists all of the adjustable parameters in a table format. Example: typing **sysparas <enter>** displays the following table:

1) Input Source [AES/EBU]	2) Analog Gain [0]
3) Input Left [0.0dB]	4) Input Right [0.0dB]
5) Output Left [+8.0dB]	6) Output Right [+8.0dB]
7) SCA Level [-20.0dB]	8) Composite 1 [3.98 V]
9) Pilot Level [10.0%]	10) Phase Adjust [0.0 deg]
11) Deemphasis [50uS]	12) Preemphasis [50uS]
13) Analog Phase [1]	14) LED Source [0]
15) Backlight [70]	16) Contrast [50]
17) Headphones [-8.0dB]	18) Separation [STEREO]
19) Editing Mode [EXPERT]	20) Current State [DISABLED]
21) Composite 2 [8.46 V]	22) Input Phase [NORMAL]
23) Preemphasis ['n/a']	24) Ctrl Port Baud [19200]
25) Mono Mode [Stereo]	26) Asym Mod ['n/a']
27) Tilt Eq ['n/a']	28) Tilt Freq ['n/a']
29) HP Filter [OUT]	30) Meta ['n/a']
31) LPF Freq ['n/a']	32) LPF Freq ['n/a']
33) BS412 [OFF]	34) Ref. Headroom [12]
35) Ave. Power [82]	36) WB AGC [IN]
37) Phase Rot. [1]	

Each 'syspara' is listed along with its currently assigned value, ie, "37) Phase Rot. [1]"

Although listed, the following 'syspara' numbers are not applicable to the Omnia 6fm:

2) Analog Gain	19) Editing Mode	28) Tilt Freq
14) LED Source	20) Current State	30) Meta
15) Backlight	26) Asym Mod	31) LPF Freq
16) Contrast	27) Tilt Eq	32) LPF Freq

Setting New Syspara Values

To find the new value you wish to use for a particular Syspara:

sysparavalues <para index #> Lists all the possible values for any parameter.)

Example: **sysparavalues 9** <enter> Displays a table listing the possible Pilot Level values.

To set a new value for a Syspara:

syspara <syspara index #>[<sysparavalue index #>]

To reset all System parameters back to their factory defaults:

sysdefaults Restores the system attributes back to their factory defaults.

To save all System settings to the rear-panel memory card.

syssave Saves the system attributes to the Omnia PC Card.

To load the saved setting from the rear-panel memory card:

sysload Loads the system attributes from the currently inserted Omnia PC Card.

Using the Script Editor

Now that the scripting commands have been defined, let's put them to work to create a Trigger Script. We'll use one of the most commonly requested operations that FM broadcasters want to easily accomplish: switching between mono and stereo operation.

This procedure can of course be done by manually using the Omnia-6fm front panel controls to turn off the 19 kHz pilot tone and to switch the input from stereo to mono left. But a far easier method is to use the Trigger Script Editor to create two scripts that can be loaded into the processor to run in response to a single relay contact closure or open. The following scripts do just that—set the Omnia-6fm to automatically switch to mono in response to a sustained contact closure and to then return to stereo operation when that same contact is opened.

In scripts, all lines that begin with "syspara" must be followed by two numbers that identify the parameter ID number that is being set and that ID number's new value. The value numbers and their settings for the Pilot Level were also shown. To list the values and parameter settings for any parameter, type in **sysparavalues** followed by a space and then the parameter's "syspara" number.

(the "sysparas" table in the Appendix lists all of the available parameter numbers.)

Trigger Script Example for Switching to Mono Operation

In this example, we'll configure Trigger Input # 1 to switch the Omnia-6fm into mono operation when the contact closes and switch back to stereo when it opens again. To create this script, open up the Script Editor and click radio button #1. Now click in the lower edit box to begin entering the Trigger 1 “Trigger Low” script. Type:

syspara 9 1 <enter>

This command sets the processor to turn off the 19 kHz pilot tone when it is run. “**syspara 9**” says to edit the Pilot Level. The “**1**” says select Off. Next, type in:

syspara 25 2 <enter>

This command sets the processor to switch the input to “mono left” when run. “**syspara 25**” says to edit the Mono Mode setting. The “**2**” says select mono left.

When you are finished, the contents of the Trigger LOW Command Script box should look like:

syspara 9 1

syspara 25 2

If you wanted to use the sum of Left and Right channels for your mono source, we would have entered the command '**syspara 25 4'** instead of '**syspara 25 2'**.

Trigger Script Example for Switching to Stereo Operation

Now we'll create a Trigger High Command Script, which will return the Omnia to stereo operation and put the pilot back to 9% injection when the switch contacts open. In the Trigger HIGH Command Script box type in:

syspara 9 32 <enter>

This tells the processor to activate the 19 kHz pilot with the injection level set to 9.0%. “**syspara 9**” says to edit the Pilot Level. The “**32**” says select 9.0% pilot level. Now type in:

syspara 25 1 <enter>

This tells the processor to switch the input to “Stereo.” “**syspara 25**” says to edit the Mono Mode setting. The “**1**” says to select stereo mode.

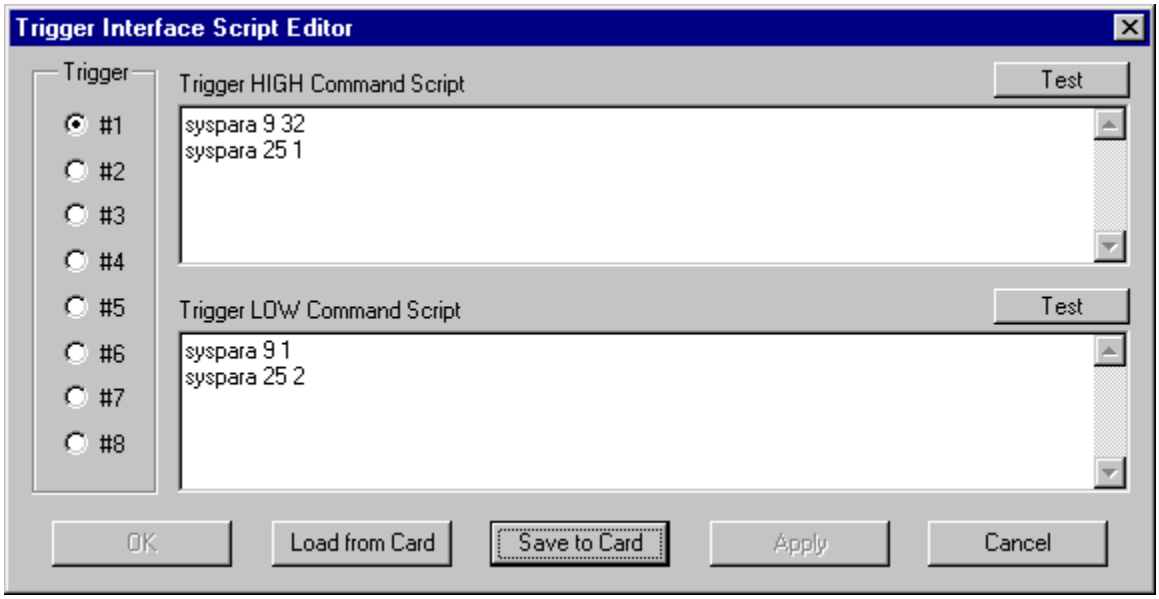
When you are finished, the contents of the Trigger HIGH Command Script box should look like:

syspara 9 32

syspara 25 1

These four commands are now a completed script for Trigger 1. To test the scripts, click the Test button

above each edit box. If no errors or other displays are shown, then your script is ready to be used or saved. An error indication typically indicates you have a "typo" in one of your command lines. Verify the command is correct and that the index numbers for the parameters or parameter values are correct. See the example below for how the completed entries should appear.



Completed Trigger Script entries using the above example

In order to use the scripts, they must be loaded into the Omnia-6fm. This is done by clicking Apply. Previously entered scripts in the Omnia-6fm's memory are then replaced by your new scripts. To save the edited Script Editor scripts to the PC Card, click Save to Card. To recall previously edited scripts, click Load From Card. These can then be sent to the Omnia-6fm by clicking Apply.

To actually use the scripts you have just written requires that a sustained relay or a switch be connected between trigger input 1 (pin 1) and ground (pin 5) on the Interface connector on the processor's back panel. Setting the relay or switch on (shorting pins 1 and 5 together), then causes the Omnia-6 to follow the script for go low (the unit switches to Mono Left/Pilot off operation). Opening the switch or relay will then cause the processor to follow the go high script (the unit switches to stereo/pilot on operation).

Multiple operations, including ones that are vastly more complicated than what we have presented here, such as simultaneously changing to different presets when changing from stereo to mono, can be completed at the flip of any one of the eight switches or relays connected to the Omnia-6fm. And the eight relays or switches do not have to be switched locally: commands can even be initiated by a network satellite when a receiver with contact closures is being used.

Different Ways to Use the Script Commands

There are two methods of using the script we just created. One is to use the scripts as Trigger Scripts, responding to contact closures and opens as previously discussed. The other involves integrating the scripts into the Omnia-6fm's daypart table. Because the processor is flexible, it allows one to use the same script

for both options.

Initiating Trigger Scripts via the Interface Connector

As we mentioned, trigger scripts give the user the ability to tie a series of commands to a simple high/low logic change occurring on a pin of the 9-pin D-sub Interface connector on the unit's rear panel. The pins on the Interface connector are assigned as follows:

PIN 1 - activates Trigger Script 1

PIN 2 - activates Trigger Script 3

PIN 3 - activates Trigger Script 8

PIN 4 - activates Trigger Script 6

PIN 5 - is connected to ground

PIN 6 - activates Trigger Script 2

PIN 7 - activates Trigger Script 4

PIN 8 - activates Trigger Script 7

PIN 9 - activates Trigger Script 5

Each pin that is to be used must first be programmed with a trigger script for the desired Go High and Go Low logic. To execute the Go Low script, a trigger input pin is connected via a sustained contact closure to pin 5 (ground). To execute a Go High script, the ground is removed from that pin. Each of the trigger pins (1, 2, 3, 4, 6, 7, 8, 9) is thus connected through a switch or relay to the Omnia-6's ground on Pin 5.

Let's review what we created for the example we showed you under "Using the Script Editor". Whenever pin 1 is held low (the contact or switch is in a closed state), the Omnia-6fm will switch to and stay in mono mode (no Pilot and only the left input channel is used). When the pin 1 contact is subsequently opened, the Omnia-6fm will switch back to and stay in stereo operation (pilot on and both left and right input channels being used) as long as the contact is open.

"One Way Script" Functions

You may also create scripting functions that do NOT return to another value when the remote contacts are opened. To do this, you use the Go LOW script only, and do not put any entries into the Go HIGH script.

Two possible uses for this very useful "Go LOW Only" Trigger Script trick are periodically setting the Omnia's system time to an external standard, and remote re-booting of the Omnia.

To use the Omnia's command line "Time" function to reset the Omnia's System Clock to midnight based on an external contact closure (such as from an automation system or other time reference), the script syntax would be:

Time 00 00 00 Sets the Omnia time to midnight. Note that colons are not used as delimiters in this entry!

Although time is displayed by the front panel display and its controller, it is actually being kept by the Omnia motherboard. When resetting the System Time using trigger scripts, the change takes effect immediately. However, because the front panel 'fetches' time synchronization from the motherboard every

few seconds, the front panel's confirmation of the time change may lag by a few seconds.

Another use of the one way script possibility (although not strongly recommended) is the remote 're-booting' of the Omnia. In that special case, there would be no Go High script entry. The Go Low script for that function would simply read: **warmboot**

Remote re-booting of the unit carries with it several caveats:

- There will be a loss of audio while the system restarts. Analog and composite audio will continue to run for approximately nine seconds, and then nine seconds of no audio will elapse while the DSP code is reloaded.
- If Omnia Remote Control is connected by a modem or direct serial connection at the time, it will be disconnected. Manual intervention will be required to reconnect.
- If Omnia Remote Control is connected by Ethernet at the time, the meters on Omnia Remote and Omnia front panel will freeze. However, when the Omnia Remote control session is disconnected, normal Omnia front panel operation will be restored. Manual intervention will be required to restart Omnia Remote Control.
- If you have not saved the System or Trigger Script settings, they may be permanently lost.

Initiating Trigger Scripts via the Daypart Scheduler

The Daypart Scheduler is typically used to change a Preset at a set day and time. But, when a trigger script is added to the Daypart table, the script can dynamically change one or multiple attributes when the Daypart is executed. A trigger script for use by the Daypart functions is written using the script editor built into the Modify Schedule Window in the Remote Software (Only). These commands can be executed using the normal daypart features.

The Scripts editor is accessed from the Modify Schedule Window by highlighting and clicking on the ***Scripts*** button. There are also test buttons on the page to force the Omnia-6fm to immediately run the current Start Script or End Script.

At the bottom of the editor window is a check box to enable or disable the use of the script. A script may be entered and saved, but will not be executed until the enable box is checked. The preset list also has an enable box which can be used to disable the default action of changing the preset in the event the daypart is to only execute the given scripts. A daypart can actually be disabled completely by not enabling either preset change, start script or end script.

Start scripts execute at the beginning of a daypart, before making a preset change (if any). End scripts execute at the end of the daypart, after making any preset changes. The script information is stored and retrieved in the same means as other daypart information.

Dayparts can still be selected, etc. from the Omnia-6fm front panel interface. However, dayparts with scripts cannot be modified in any way from the front panel.

Note: Remember not to include any commands which may potentially prompt the user since a user may not be at the Omnia-6fm when the commands are executed.

Note: The remote control application does not have to be connected in order for the scripts to execute.

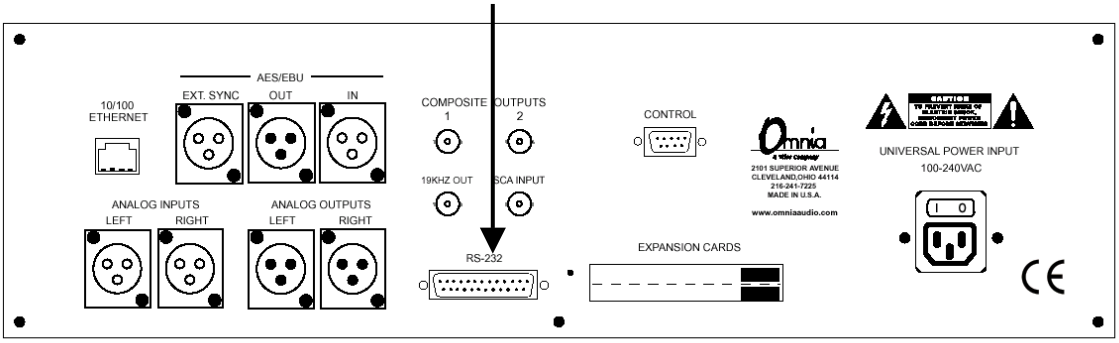
Chapter 7

Troubleshooting your Omnia 6

Many operational problems with the Omnia 6fm can be diagnosed using the rear-panel RS-232 port and a terminal communications program.

Detailed information about the boot progress may be gleaned using the RS-232 port. This chapter explains the various boot up and error messages that may be encountered. We'll cover some basic troubleshooting techniques for isolating problems in the field, and also how to obtain help or repair service from Omnia.

Rear panel RS-232 port



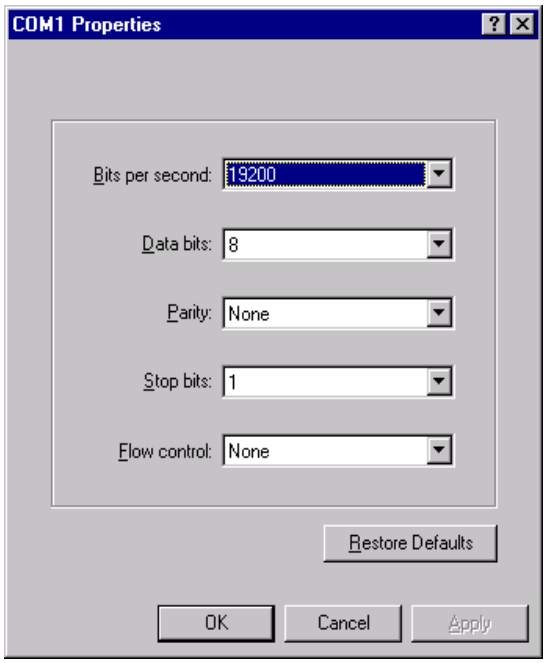
To use this feature you only need a standard terminal program for DOS, Windows, or other operating system. Configure it for a baud rate of 19,200, with no hardware handshaking, and using ANSI terminal emulation. At Omnia, we commonly use the Hyperterminal© program that comes with Microsoft Windows©. We've used and tested other terminal programs such as ProComm© as well. Therefore, you should use the program with which you are most familiar and comfortable.

If you're using Windows© Hyperterminal©, please see the next page for examples of screen shots showing how we've set up our connection here at Telos/Omnia.

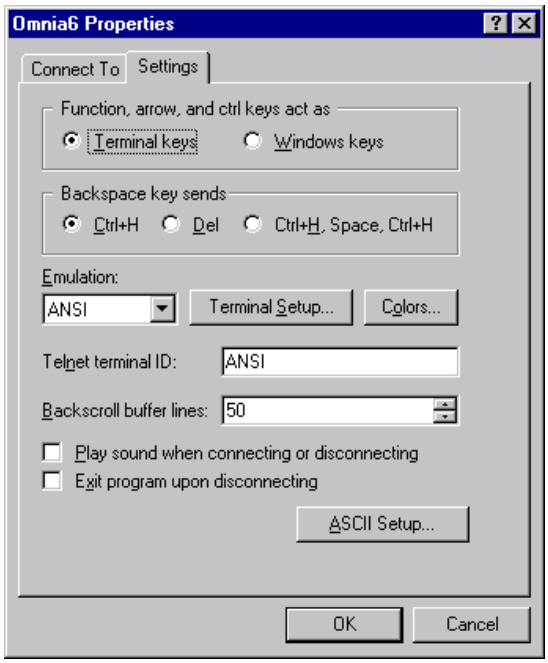
Port Setup for MS Windows Hyperterminal

The following examples illustrate how to configure Windows© Hyperterminal© for use on the Omnia 6 RS-232 port.

COM Port Setup Parameters



Terminal Emulation Parameters



Once these parameters have been entered and saved as a connection profile, they can be used to capture and display (and/or print) the output of the Omnia 6's RS-232 serial port during boot up. Note that the Omnia's serial port is designed to operate without handshaking. This makes it compatible with a variety of external devices. It also makes it "stupid", meaning that you don't need fancy interface equipment or strange combinations of jumpers on the RS-232 connector in order to make it 'talk'.

At Omnia, we commonly use Hyperterminal© with only the serial port's receive data line and ground connected. This creates a simple, two-wire interface 'listen mode' that we can use for troubleshooting.

See the next page for an example of a normal Omnia 6 boot up message that can be obtained from the rear-panel's RS-232 serial port...

Normal Boot-up Message

A 'healthy' Omnia 6 will transmit the following message on the rear-panel serial port during boot up:

Omnia BIOS Software 1.13
Work: BIOS v1.13...
Work: Downloading OS...
Work: Downloading OS...
Work: Downloading OS...
Work: Downloading OS...
Work: Downloading OS...
Work: Downloading OS...
Work: Downloading OS...
Work: Downloading OS...
Work: Omnia 6.01.00...
Work: Omnia 6.01.00... ← **May vary as a function of installed software version**
Work: System Storage...
Work: Omnia Card...
Work: Preset Table...
Msg : set preset RocknRoll (alg old:(null) alg new:fm_6band) ←
Work : Load Algorithm...
Work: Load Algorithm...
Work: Load Algorithm...
Work: Load Algorithm...
Work: Load DSPs...0 **Varies according to preset selected**
Work: Load DSPs...1
Work: Load DSPs...2
Work: Load DSPs...3
Work: Load DSPs...4
Work: Load DSPs...5
Work: Load DSPs...6
Work: Load DSPs...7
Work: Load DSPs...8
Work: Load DSPs...9
Work: Load DSPs...10
Work: Load DSPs...11
Work: Load DSPs...11
Work: Load DSPs...11
Work: AES/EBU...
ERROR: Error initializing AES/EBU. (Ignore this message on O6.)
Work: IO Card...
Work: Command System...
Work: Graphics...
Work: Graphics...

Audio Failure Alarm

If no audio is applied to the Omnia, the following messages will be transmitted on the RS-232 port approximately twenty seconds after a successful boot up:

Flr : Audio failure: left input

Flr : Audio failure: right input

Flr : Audio failure: left output

Flr : Audio failure: right output

In the absence of an audio source, these "Audio failure" messages are normal. Note that the Omnia's audio failure trigger level is –37.5dBFS, and the signal must remain at or below that level in order for the silence detect algorithm to time out. It is possible to see these messages during normal programming if the audio input level falls below –37.5dBFS and remains there until the audio fail algorithm times out.

Audio Restoration Alarm

Approximately five seconds after audio has been restored to levels above –37.5dBFS, the following messages will be seen:

Flr : Audio restored: left input

Flr : Audio restored: right input

Flr : Audio restored: left output

Flr : Audio restored: right output

Note that it is possible for there to be audio *Output* failure messages but no audio *Input* failure message. This means that the unit is detecting applied audio at its Inputs, but that there is no output from the DSP chain.

From the perspective of signal flow, the Input meters follow the input level adjustment controls (Input Menu). This is also where the input to the Input Audio Failure comes from.

Diagnostic and Error Messages

Work: Insert card to continue!!!

(non-fatal error)
The operating system cannot see the rear-panel PCMCIA memory card. Turn power off and make sure that the card is fully seated, then return power to cure this message.

Card does not have valid OS!!!

(a fatal error)
The contents of the rear-panel memory card do not match what the operating system expects. There is no bootable image on the card.

No previous system found in memory

(a non-fatal and self-correcting error)
The contents of the non-volatile RAM on the motherboard do not match what is on the rear-panel memory card. This can be caused by a new memory card being inserted, or by the Omnia being booted up for the first time after the non-volatile memory has been cleared.

NVRAM failure

(a fatal error)
The operating system was unable to write to the non-volatile RAM on the motherboard.

Failed to initialize RTC

(a fatal error)
The operating system could not initialize the Real Time Clock IC on the motherboard.

Dead battery, data lost.

(a fatal error)
The Lithium battery used for system configuration backup is being reported as dead or battery voltage is too low for reliable operation.

Timed out loading DSP. len = 8658 ← (Exact 'len' may vary)
Failed DSP #7 bootstrap, contact CE. ← (DSP Card number may vary)
(a fatal error)
The operating system was not able to initialize a DSP card or one of the two IC's on the card. Note that the DSP # can vary depending on which card is involved.

Host command bit not clear

ERROR: read failed write address, DSP #8 0100e3 ← (write address may vary)
(a fatal error)
The operating system was unable to communicate with the DSP's host port.
Note that the DSP# and memory location referenced can change.

Failed routing, contact CE.

(a fatal error)
The operating system was unable to establish the correct signal path routing through the DSP chain.

Clearing corrupted Non-volatile RAM contents

Occasionally during a software upgrade, the contents of the motherboard's on-board non-volatile RAM (NVRAM) will contain entries that are inappropriate for the version of software that has just been installed. An excellent example of such behavior is a unit that has been upgraded from DSP software version 6.00.13 to 6.01.00. The different (and finer) calibration of the Limiter Output controls in the later version causes an index mismatch in the lookup table for the controls at the first boot up. Until the user adjusts each Limiter Mixer control manually to 're-index' the controls, the Limiter Mix values can be different from what was in the earlier software. To reset the motherboard non-volatile RAM to prevent (or cure) such behavior, it is necessary to temporarily remove a shunt jumper on a three pin header labeled S1 at the left rear corner of the motherboard (see below).

1. Remove the Omnia 6 from service.
2. Make certain that no power is applied to the unit.
3. Remove all 30 top cover screws and set them aside.
4. Remove the lid and set it aside.
5. Move shunt jumper "S1" from the "NC" to the "NO" position. Wait at least 30 seconds.
6. Move shunt jumper "S1" from the "NO" to the "NC" position.
7. Re-install the Omnia lid, using all 30 screws. Tighten each screw snugly. Failure to affix the lid with all 30 screws may compromise the units susceptibility to RF energy, as well as its electromagnetic radiation compliance certification.
8. Return the Omnia 6 to service.

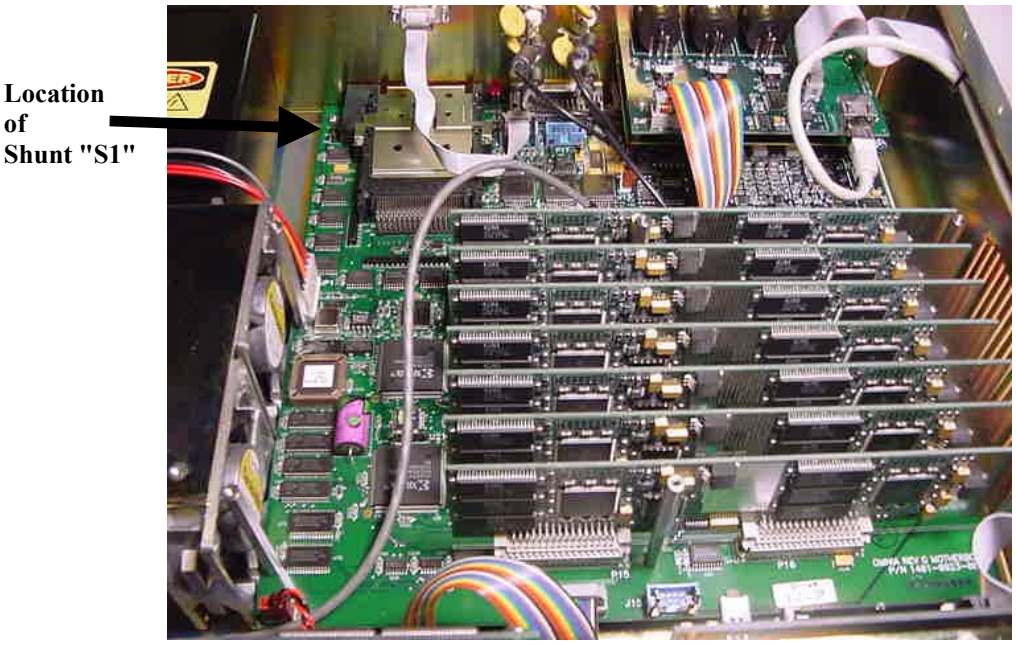
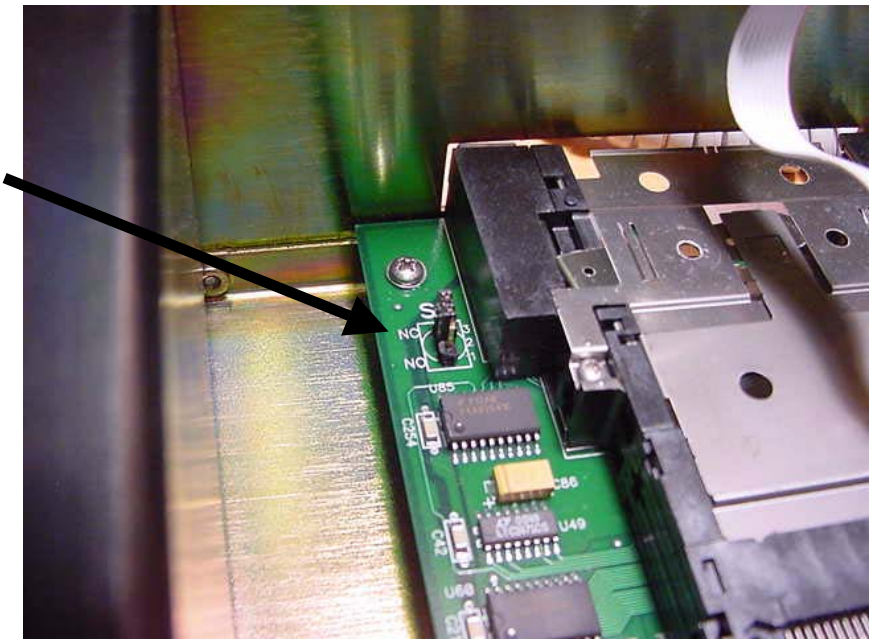


Photo of motherboard showing location of shunt "S1"

In order to clear the non-volatile RAM, it is necessary to move the shunt jumper from the normal operating position labeled "NC", to the position labeled "NO". You must then leave the shunt jumper in the "NO" position for at least 30 seconds in order for the contents of the non-volatile to be fully cleared. Failure to follow this advice and wait long enough may result in partial erasure of the non-volatile contents and invalid entries in the parameter lookup tables.



Close up photo of shunt jumper "S1"
(shown in the normal, "NC" position)

Once the contents of the non-volatile RAM have been cleared remove the jumper from the "NO" terminals and re-install it on the terminals marked "NC". Note: Failure to re-install the jumper on the "NC" terminals will prevent operating power from being applied to the non-volatile RAM at boot up, and the motherboard will be unable to initialize. The only location that these 'boot failure' error messages will appear is on the rear-panel RS-232 port, discussed previously. The only symptom visible from the front panel will be the rotating Omnia logos becoming stationary and not being replaced by the menu and meter screens (see below).

Diagnosing abnormal boot up behavior

The rotating Omnia logos are shown below stopped and not replaced by the usual menu and meter screens. This means that one or more functions on the Omnia motherboard have not been initialized, but the front panel is alive and well. In this scenario, it is helpful to view the Omnia 6 boot progress using the rear panel RS-232 serial port and the procedure outlined earlier in this chapter.

Possible causes for this behavior are:

1. The rear-panel PCMCIA memory card is not properly seated in its socket. Power off the unit, reseat the card, and power on again. If the problem does not clear up, call the Telos/Omnia Customer Focus department for instructions.

2. The rear-panel PCMCIA memory card has become corrupted.

3. There has been a problem loading the DSP code algorithms, perhaps because of a faulty DSP card.

4. There is a problem on the motherboard that is preventing the main CPU from booting up. Call the Telos/Omnia Customer Focus department for instructions.

Electrical and mechanical safety note!

When the Omnia is operated with its chassis top cover removed, you are exposed to potentially lethal voltages and high speed rotating fan blades.

Before attempting to make voltage measurements, be forewarned that the power supply heat sinks are connected to the AC power line.

The LCD back light inverters (the two large, black modules) on the front-panel controller board have an output of over 1,200 volts AC with the LCD back lights off, and in excess of 600 volts with the back lights on! Do *NOT* attempt to measure them.

Avoid these areas whenever the AC power cable is attached to the Omnia. Never attempt to make measurements when the power supply's safety cover is removed, or near the LCD inverters on the front panel controller PC board!

Be forewarned that the two fans present a serious hazard to fingers, tools, and meter probes. The fan blades rotate at high speed and have very sharp edges. They can quickly and easily remove a fingertip (gee ... how do we know this?) Coming into contact with a rotating fan blade will cause serious injury.

When reinstalling the top cover, make certain that all thirty screws are replaced, and that they are tightened to a snug fit. Operating the unit with its cover removed or without all of the retaining screws will void your warranty and may compromise the ability of the Omnia to operate in high RF environments.

Narrowing down problems

When actually troubleshooting your Omnia-6, try to ascertain some preliminary information first before embarking on an in-depth problem-solving mission. Take time to carefully consider whether your unit falls into any of the following states:

1. The unit totally dead. Is the power on? Is the line cord plugged into an outlet that has AC power? Is there an audio input level? Is there an audio output level? Is there a power indication? Are the LCD screens blank, scrambled, or not illuminated? Symptoms like these might indicate a power supply problem. If you wish to examine the power supply, be aware that it is *switching* type, and therefore requires a load in order to start up and operate properly. Voltages measured when the power supply is not connected to the Omnia motherboard may not be correct.

2. The unit has power, but there is no audio output although the processing bargraphs are working. The first thing to verify is whether the front panel jog-wheel is operational. Verification of front panel operation helps narrow down where the problem is. Look at the levels display. If there is input audio but no output audio indications, try cycling the unit's power. If that doesn't bring the operation back to normal, then a hardware failure of some sort has occurred. If you get output levels but have no output audio, verify that the outputs are connected correctly. An analog output connected to a digital device, or a digital output connected to an analog device won't pass audio! Connect the appropriate test generator to the output cables to verify analog/digital audio is making it to the next device.

The next condition to check is to see if the failure has caused the processing to cease. Using program material, check to see if the processing bargraphs are operating. If they are, then it's a good indication that the basic DSP structure is sound and the system's host processor is working. At this point, it would be a good idea to see if the loss of audio is confined to only one output port, e.g. a composite output, the discrete left/right outputs or the AES/EBU output. Check the signal at each of these locations. If the signal is dead at all three, then this points to a digital audio problem after the dynamic processing DSP chips. If one of the output sections is not operating, then it can be localized to that specific section.

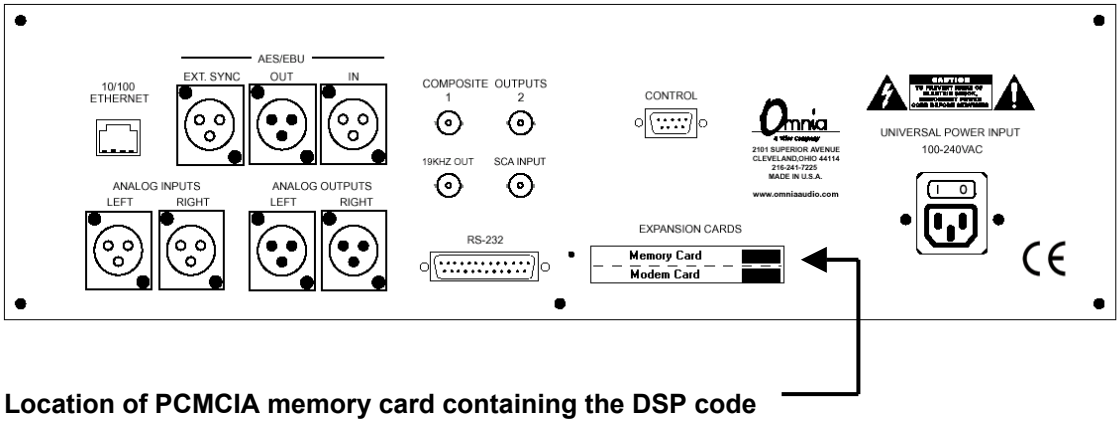
Note: The composite outputs and the discrete left/right outputs are operated from their own specialized Digital to Analog converters. Therefore, it's possible for one type of output to fail without affecting the other. Likewise, a failure in the AES/EBU driver section could result in the digital output being dead, while the rest of the system is operational.

3. Unit has power, but no audio and no processing indications. Check to make certain that the Input Source selected in the INPUT menu is correct for the input type being used. If so, then there may be some form of problem within the DSP environment, the host microprocessor or a combination of both. We recommend that you contact Omnia Customer Focus for immediate attention.

4. Unit has power, the audio is working, but both front panel displays show the rotating Omnia logo and then stop. This indicates a communications error between the front panel and the master motherboard CPU, or a failure of the motherboard to initialize either the DSP code or operating system. In the unlikely event that your Omnia-6fm is out of service and in need of assistance from Omnia, please see the section entitled Obtaining Service for contact information.

Performing software upgrades in the field

The Omnia 6 design is extremely flexible in that it allows unlimited possibilities for software updates and feature enhancements. By simply replacing PCMCIA type memory cards, the DSP software and/or front panel user interface can be updated and new features are added. Some software updates will have only one card, while others will have two. In most cases, only the rear-panel PCMCIA memory card will need to be replaced, as that contains the DSP code and its enhancements.



Location of PCMCIA memory card containing the DSP code

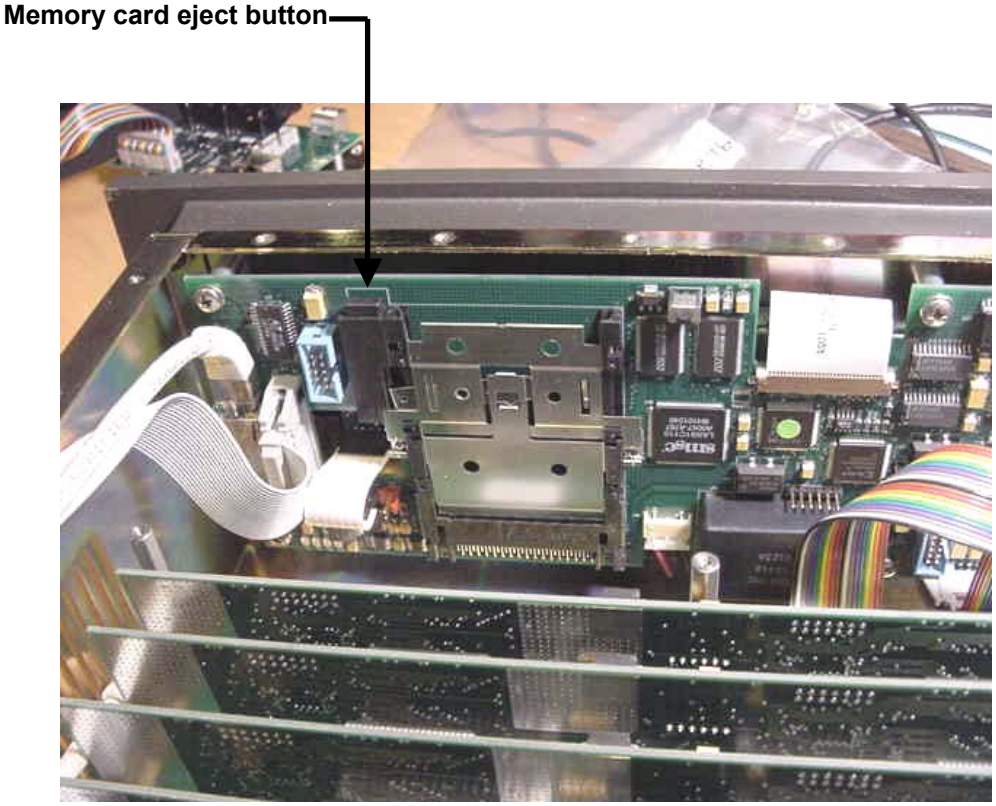
Software enhancements that are contained on the rear panel PCMCIA memory card can be installed without taking the Omnia 6 out of the equipment rack. To install a new card, please follow these steps:

1. Remove the Omnia 6 from service.
2. Make certain that no power is applied to the unit.
3. Remove the present card by pressing in on the black card eject button for the TOP card slot. Set the old card aside.
4. Install the new card, making certain to insert it with the Omnia label side facing UP. Push the card in until the card is fully seated and the black card ejector has popped back out.
5. Return the Omnia 6 to service.

Location of PCMCIA memory card containing the front panel user interface

Software enhancements that are contained in the front panel PCMCIA memory card must be installed internally on the front panel display controller board itself. The display controller card has its own PCMCIA memory card containing the front panel user interface program and its enhancements. To install a new card, follow these steps.

9. Remove the Omnia 6 from service.
10. Make certain that no power is applied to the unit.
11. Remove all 30 top cover screws and set them aside.
12. Remove the lid and set it aside.
13. Remove the front panel memory card by fully depressing the card eject button (see below).
14. Re-install the new memory card, making sure that it is fully seated in the PCMCIA connector.
15. Re-install the Omnia lid, using all 30 screws. Tighten each screw snugly. Failure to affix the lid with all 30 screws may compromise its susceptibility to RF energy, as well as is electromagnetic radiation compliance certification.
16. Return the Omnia 6 to service.



Rear view of the front-panel controller card with the Omnia 6's top cover removed. The PCMCIA memory card slot is shown empty.

Obtaining Service

- Omnia Customer Focus personnel are available in Cleveland, Ohio, USA, Monday through Friday between 9:00 A.M. and 6:00 P.M., Eastern Time. If outside the U.S.A., see below.
- Before contacting Omnia Customer Focus, please have the serial number of the unit (located on a barcode sticker on the rear panel in this format: 4700XXYYYY) and a description of the symptoms/problems ready for the technician.
- All units being returned to for service MUST have a Return Authorization (RA) number assigned to them first. Units that are returned without a RA number will experience delays in service.
- Return the Omnia in its original shipping carton. For best treatment, shipping the Omnia in its original factory box protects it as well as possible. Damage caused by improper packaging is not covered under your warranty!
- Loaner units are usually available on a first come, first served basis. Your Omnia Customer Focus engineer will assist you with the necessary arrangements.

Via the World Wide Web

The Omnia Web site has a wide variety of information that may be useful for product support, applications information, software updates, etc. The URL is: http://www.omniaaudio.com.

Via E-Mail

The customer service e-mail address for Omnia is: support@omniaaudio.com.

Via Phone & Mail (USA and non-European Countries)

Customer service is available by telephone, Monday – Friday between 9:00 A.M. and 6:00 P.M., USA Eastern time zone.

Phone: +1.216.241.7225 **Fax:** +1.216. 241.4103

Shipping Information: * Omnia Customer Service
2101 Superior Avenue
Cleveland, Ohio 44114 USA

Via Phone & Mail for Europe

Service is available from the Omnia Europe office in Freising, Germany.

Phone: +49 8161 42467 **Fax:** +49 8161 42402

Shipping Information: * Omnia Europe
Johannistraβe 6
D-85354 Freising, Germany

Note: To ensure prompt service, the Return Authorization number must be written prominently on or near the shipping label on the box!

Omnia-6 Parameter Worksheet

Preset Name:_____

By: _____

Date: _____

Parameter	Value
Input Submenu	
Input Source	
Input Gain Left	
Input Gain Right	
Master Gain	
Input Mode	
High Pass Filter	
Phase Rotator	
Pre-emphasis	
Invert Both?	

Parameter	Value
WB-AGC	
AGC Drive	
Attack	
Release	
Make-Up Gain	
Gate Thresh	
RTP Speed	
RTP Level	
AGC In/Out	

Parameter	Value
AGC X-Over	
Low Gain	
Mid-Low Gain	
Mid-High Gain	
High Gain	
Super-High Gain	
LF->ML X-over Freq	
ML->MH X-over Freq	
MH->HF X-over Freq	
HF->SHF X-over Freq	

Parameter	Value
LF-AGC	
Attack	
Release	
Make-Up Gain	
Gate Thresh	
RTP Speed	
RTP Level	
ML-AGC	
Attack	
Release	
Make-Up Gain	
Gate Thresh	
RTP Speed	
RTP Level	
MH-AGC	
Attack	
Release	
Make-Up Gain	
Gate Thresh	
RTP Speed	
RTP Level	
HF-AGC	
Attack	
Release	
Make-Up Gain	
Gate Thresh	
RTP Speed	
RTP Level	
SH-AGC	
Attack	
Release	
Make-Up Gain	
Gate Thresh	
RTP Speed	
RTP Level	

Parameter	Value
AGC Mixer	
Low Band	
Mid-Low Band	
Mid-High Band	
High Band	
Super High Band	

Parameter	Value
Enhancers	
Deep Bass	
Phat Bass	
Warmth	
Stereo-EXP	
Limiter X-Over	
Super Low Gain	
Low Gain	
Mid-Low Gain	
Mid-High Gain	
High Gain	
Super-High Gain	
SL-Limiter	
Attack	
Release	
Hold Thresh	
Limit Thresh	
LO-Limiter	
Attack	
Release	
Hold Thresh	
Limit Thresh	
ML-Limiter	
Attack	
Release	
Hold Thresh	
Limit Thresh	
MH-Limiter	
Attack	
Release	
Hold Thresh	
Limit Thresh	
HI-Limiter	
Attack	
Release	
Hold Thresh	
Limit Thresh	
SH-Limiter	
Attack	
Release	
Hold Thresh	
Limit Thresh	

Parameter	Value
Limiters Mixer	
Super-Low Band	
Low Band	
Mid-Low Band	
Mid-High Band	
High Band	
Super-High Band	
Clipper	
Bass Clip Thresh	
Drive	
Clipper Silk	
Comp Clip Drive	

Parameter	Value
Output Submenu	
Peak Level Left	
Peak Level Right	
Bypass?	
BS-412 Limiter In?	
Multiplex Pwr Level	
De-emphasis	
Output Sample Rate	
Output Sync To?	

Parameter	Value
Encode Submenu	
Composite #1	
Composite #2	
SCA Level	
Pilot Injection	
Pilot Phase	
Separation	

A P P E N D I X A

CE Declaration of Conformity

Supplementary Information for our European Users

CE

Declaration of Conformity

Application of Council Directives: 93/68/EEC (CE marking); 73/23/EEC (safety-low voltage directive); 89/336/EEC (electromagnetic compatibility).

Standards to which conformity is declared: EN50081-1, EN50082-1.

Manufacturer's Name: Omnia, TLS Corporation

Manufacturer's Address: 2101 Superior Avenue, Cleveland, Ohio, USA

Type of Equipment: Audio Processor

Model No.: Omnia-6

Serial No.: _____

Year of Manufacture: 2001

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directives and Standards.

Place: Cleveland, OH USA 44114

Date: July 19, 2001

Signature: _____ (on file)

Full Name: Frank Foti

Position: President

CE Mark Conformance

July 19, 2001

Omnia, TLS Corp.
2101 Superior Avenue
Cleveland, OH USA 44114

Supervision and summary by: _____
Frank Foti

1.0 Introduction

1.1 Scope This record is intended to document the Omnia audio processor conformance with Council Directives: 93/68/EEC (CE marking); 73/23/EEC (safety-low voltage directive); 89/336/EEC (electromagnetic compatability).

Testing was conducted during the period DATE.

1.2 Purpose Testing was performed to evaluate safety, emissions, and immunity, conformance to enable CE marking.

1.3 Conclusions The Omnia audio processor was found to be compliant and CE marking was applied to the product.

CE Mark Conformance, contd.

Conformity is declared to the standards: EN50081-1, EN50082-1.

2.0 HF Radiated Emissions

2.1 Standards Applied The unit was laboratory evaluated according to standard: EN50081-1 using Measurement Document: EN55022, Class B.

2.2 Testing The unit was tested and evaluated by: Smith Electronics *
2.3 Test Results The unit was found to be in conformance for both radiated and line-conducted emissions.

3.0 Immunity

3.1 Standards Applied

3.1.1 ESD Susceptibility Measurement Document: IEC 1000-4-2 (IEC 801-2). Immunity to static electricity.

3.1.2 Radiated Susceptibility – HF Electric Field Measurement Document: IEC1000-4-3 (IEC 801-3).

3.1.3 Conducted Susceptibility – Power Line Measurement Documents: Burst/Transients: IEC1000-4-4 (IEC 801-4) Surge: IEC1000-4-5 (IEC 801-5) Voltage fluctuations: IEC1000-4-1 (IEC 801-1)

3.2 Testing

3.2.1 ESD Immunity The unit was tested and evaluated by: Smith Electronics *

3.2.2 Radiated Immunity – RF Electric Field The unit was tested and evaluated by: Smith Electronics *

3.2.3 Conducted Immunity – Power Line Testing to IEC801-4 was conducted by: Smith Electronics *

* Smith Electronics
8200 Snowville Rd.
Cleveland, OH 44141 (USA)

CE

CE Conformance

This device complies with the requirements of EEC Council Directives: 93/68/EEC (CE marking); 73/23/EEC (safety-low voltage directive); 89/336/EEC (electromagnetic compatibility).

Conformity is declared to the following standards: EN50081-1, EN50082-1.

Lithium Battery Caution: Danger of explosion if the lithium battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Use of Shielded Cables

In order to conform to the CE requirements for HF radiation, shielded cables should be used for the audio and data connections. For audio connections, the cable shield should be connected to the XLR shell.